

DISKIO16

IMP-16 ASSEMBLER REV-H 09/08/75
DISKIO P00876C 12/03/75

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1      .TITLE DISKIO16 , ' P00876C 12/03/75 '
2      ;*****
3      ;
4      ; IMP#          PROM#          ROM#          BOARD COORDINATE
5      ; IMP-16F/006A  4600876        N/A          1D
6      ; IMP-16F/006B  4610876        N/A          1E
7      ; IMP-16F/006C  4620876        N/A          1A
8      ; IMP-16F/006D  4630876        N/A          2A
9      ;
10     ;*****
11     ;*****
12     ;
13     ; DISKIO IS A SUBROUTINE DESIGNED TO ALLOW COMMUNICATIONS
14     ; WITH A DUAL DRIVE FLOPPY DISK VIA THE DISK INTERFACE
15     ; BOARD.
16     ;
17     ;
18     ;
19     ; THERE ARE TWO ENTRY POINTS:
20     ;
21     ; 1) DISKIO USES THE PHYSICAL SECTOR NUMBER.
22     ;
23     ; 2) DISK2 CONVERTS THE LOGICAL SECTOR NUMBER INTO A
24     ; PHYSICAL SECTOR NUMBER USING THE BAD SECTOR TABLE,
25     ; THEN CALLS DISKIO.
26     ;
27     ;
28     ;
29     ; CALL DISKIO AS FOLLOWS:
30     ;
31     ; JSR DISKIO
32     ; .WORD PLIST          ;PARAMETER LIST POINTER
33     ; .....              ;ERROR RETURN HERE
34     ; .....              ;NORMAL RETURN HERE
35     ;
36     ;
37     ;
38     ; PLIST: .WORD COMMAND      ;7=WRITE, 2=READ
39     ; .WORD LOGSECT          ;LOGICAL SECTOR NUMBER
40     ; .WORD BUFADDR         ;BUFFER ADDRESS
41     ; .WORD 0                ;STAU$ RETURNED HERE
42     ; .WORD 0                ;PHYSICAL SECTOR RETURNED
43     ;
44     ;*****
45     ;*****
46     ; RAM LOCATIONS USED BY THE DISKIO ROUTINES
47     ;*****
48     ;
49     ; MRAM-0              TRACK COUNTER 0
50     ; MRAM-1              TRACK COUNTER 1
51     ; MRAM-2              DISK STATUS
52     ; MRAM-3              DISK DATA
53     ; MRAM-4              TRACK DIRECTION REGISTER
54     ; MRAM-5              AC0
55     ; MRAM-6              AC1
56     ; MRAM-7              AC2
57     ; MRAM-8              AC3
58     ; MRAM-9 THROUGH MRAM-18  STACK-15 TO STACK-0
59     ; MRAM-19             IEN
60     ; MRAM-1A             ERROR COUNTER
61     ; MRAM-1B             FLAGS

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62      ;          MRAM-1C          BAUD RATE SWITCH FOR TTY/CRT
63      ;          MRAM-1D          TEMP LOC FOR TTY/CRT BIT COUNT
64      ;*****
65      ;
66      ;          TRACK DIRECTION REGISTER BIT ASSIGNMENT
67      ;
68      ;          *****
69      ;          *DRIVE2*DRIVE1*
70      ;          * BIT1 * BIT0 *
71      ;          *****
72      ;          * 0=OUT* 0=OUT*
73      ;          * 1=IN * 1=IN *
74      ;          *****
75      ;
76      ;*****
77      ;
78      ;          HARDWARE BIT DEFINITIONS
79      ;
80      ;*****
81      ;
82      ;
83      ;          HARDWARE STATUS BIT DEFINITIONS
84      ;
85      ;BIT 0 = RSYNC (SYNC-CHARACTER HAS BEEN RECOGNIZED).
86      ;BIT 1 = TRACK 0* (LOW WHEN HEAD IS AT TRACK 0).
87      ;BIT 2 = INDEX* (LOW WHEN INDEX MARK IS DETECTED).
88      ;BIT 3 = FILE INOPERABLE* (LOW WHEN A CONDITION WHICH ENDANGERS
89      ;          THE DATA ON THE DISKETTE ).
90      ;BIT 4 = READY* (LOW WHEN THE DRIVE IS TURNING AND THE DOOR IS
91      ;          CLOSED).
92      ;BIT 5 = TTY/CRT BAUD SELECTION.
93      ;BIT 6 = TTY/CRT BAUD SELECTION.
94      ;
95      ;
96      ;
97      ;
98      ;          HARDWARE CONTROL SIGNALS
99      ;
100     ;BIT 0 = RSTEN (RESET ENABLE SIGNAL TO LOOK FOR SYNC CHARACTER).
101     ;BIT 1 = WREN (WRITE ENABLE SIGNAL)
102     ;BIT 2 = STEP (STEP HEAD ONE TRACK FOR EACH PULSE).
103     ;BIT 3 = DIRECTION (SET DIRECTION THE HEAD IS TO BE MOVED).
104     ;BIT 4 = FILE RESET (RESETS FILE INOPERABLE LATCH).

105     .PAGE
106     ;*****
107     ;
108     ;          DEFINITIONS
109     ;
110     ;
111     ;*****
112     ;
113     .ASECT
114     0000      = X'C000
115     ;
116     ;          PROGRAM ENTRY POINTS
117     ;
118     C000 2500 A PDBOOT: JMP      @.+1
119     C001 C00E A      .WORD      DBOOT
120     C002 2500 A TTYGET: JMP      @.+1
121     C003 C28A A      .WORD      GETC
122     C004 2500 A TTYPUT: JMP      @.+1

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123 C005 C31A A      .WORD  PUTC
124 C006 2500 A TTYGCO: JMP    @.+1
125 C007 C2A8 A      .WORD  GECO
126 C008 2500 A LDISK: JMP    @.+1
127 C009 C255 A      .WORD  DISK2      ;LOGICAL DISK I/O
128 C00A 2500 A PDISK: JMP    @.+1
129 C00B C01D A      .WORD  DISKIO     ;PHYSICAL DISK I/O
130 C00C 2500 A TRAM:  JMP    @.+1
131 C00D C276 A      .WORD  TOPRAM     ;TOP-OF-RAM DETERMINATION
132
133      0001 A      IEN  = 1          ;INTERRUPT ENABLE FLAG
134      0002 A      SEL  = 2          ;SELECT FLAG
135      0000 A      AC0  = 0          ;ACCUMULATOR ZERO
136      0001 A      AC1  = 1          ;ACCUMULATOR ONE
137      0002 A      AC2  = 2          ;ACCUMULATOR TWO
138      0003 A      AC3  = 3          ;ACCUMULATOR THREE
139      0008 A      SNRDY = 8
140      0001 A      MISYNC= 1
141
142      ;
143      ;      BRANCH ON CONDITION CODES
144      0001 A      ZRO   = 1
145      0002 A      POS   = 2
146      0003 A      BIT0  = 3
147      0004 A      BIT1  = 4
148      0005 A      NZRO  = 5
149      0009 A      IEN2  = 9
150      000A A      CYOV  = 10
151      000E A      WRJC  = 14
151      000E A      NRDY  = 14

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152      .PAGE
153      ;*****
154      ;
155      ;      DISK BOOT ROUTINE
156      ;*****
157      ;
158      ;
159 C00E 29FD A DBOOT: JSR    TRAM
160 C00F 4DFF A      LI     AC1,-1      ;CLEAR TRACK POINTERS
161 C010 A700 A      ST     AC1,(AC3)
162 C011 A7FF A      ST     AC1,-1(AC3)
163
164 C012 290A A      JSR    DISKIO      ;READ DBOOT
165 C013 C018 A      .WORD  $LIST
166 C014 2101 A      JMP    ERROR
167 C015 2000 A      JMP    0          ;TRANSFER CONTROL TO DBOOT
168
169 C016 0000 A ERROR: HALT
170 C017 21F6 A      JMP    DBOOT      ;TRY AGAIN
171
172 C018 0002 A $LIST: .WORD  2,1,0,0,1
173      C019 0001 A
174      C01A 0000 A
175      C01B 0000 A
176      C01C 0001 A

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173      .PAGE
174      ;*****
175      ;
176      ;      DISK I/O ROUTINE
177      ;*****
178      ;
179

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180      ;      DETERMINE THE MAXIMUM RAM LOCATION (STARTING WITH
181      ;      LOCATION X'6FFD DOWNWARD UNTIL RAM IS FOUND).
182      ;      SAVE THE REGISTERS, STACK, IEN, FLAGS AND
183      ;      CLEAR IEN.
184      ;
185      ;*****
186      ;
187      C01D 4300 A DISKIO: PUSH      AC3          ;SAVE AC3
188      C01E 8D0E A      LD          AC3,TMPTR
189      C01F A300 A A3:      ST          AC0,(AC3)      ;FINDS TOP OF SYSTEM MEMORY
190      C020 F300 A      SKNE        AC0,(AC3)
191      C021 2102 A      JMP          A4
192      C022 DD0B A A5:      SUB          AC3,CONT1      ;TRY DOWN 4K
193      C023 21FB A      JMP          A3
194      C024 5000 A A4:      CAI          AC0,0
195      C025 A300 A      ST          AC0,(AC3)
196      C026 F300 A      SKNE        AC0,(AC3)
197      C027 2102 A      JMP          A6
198      C028 5000 A      CAI          AC0,0      ;FALSE ALARM
199      C029 21FB A      JMP          A5
200      C02A 5000 A A6:      CAI          AC0,0
201      C02B 2104 A      JMP          BSAV
202      ;
203      C02C 0002 A WRD2:      .WORD      2
204      C02D 6FFD A TMPTR:      .WORD      X'6FFD
205      C02E 1000 A CONT1:      .WORD      X'1000
206      C02F 0009 A CONT2:      .WORD      X'9
207      C030 CDFB A BSAV:      ADD          AC3,WRD2
208      C031 ABF9 A      ST          AC2,-7(AC3)      ;AC2 CONTENTS STORED
209      C032 4600 A      PULL         AC2          ;ORIGINAL CONTENTS OF AC3
210      C033 ABF8 A      ST          AC2,-8(AC3)      ;AC3 CONTENTS STORED
211      C034 A7FA A      ST          AC1,-6(AC3)      ;AC1 CONTENTS STORED
212      C035 A3FB A      ST          AC0,-5(AC3)      ;AC0 CONTENTS STORED
213      C036 3E81 A      RCPY         AC3,AC2
214      C037 D9F7 A      SUB          AC2,CONT2
215      C038 4500 A      PULL         AC1          ;TOP OF STACK
216      C039 0080 A      PUSHF
217      C03A 4400 A      PULL         AC0
218      C03B A3E5 A      ST          AC0,-01B(AC3)
219      C03C A600 A      ST          AC1,(AC2)      ;FLAGS CONTENTS STORED
220      C03D 4C0F A      LI          AC0,15
221      C03E 4AFF A B1:      AISZ         AC2,-1      ;RAM 'STACK' ADDRESS
222      C03F 4500 A      PULL         AC1          ;PULL STACK
223      C040 A600 A      ST          AC1,(AC2)      ;STORE STACK IN RAM
224      C041 48FF A      AISZ         AC0,-1      ;FINISHED STORING STACK?
225      C042 21FB A      JMP          B1          ;NO
226      C043 4C01 A      LI          AC0,1          ;YES
227      C044 1901 A      BOC          IEN2,C1
228      C045 4C00 A      LI          AC0,0
229      C046 0980 A C1:      PFLG        IEN          ;CLEAR INTERRUPT ENABLE
230      C047 A2FF A      ST          AC0,-1(AC2)      ;IEN STATUS STORED

231      .PAGE
232      ;*****
233      ;
234      ;      DISK HARDWARE ADDRESS DETERMINED AND STORED
235      ;
236      ;*****
237      ;
238      C048 9BF7 A D:      LD          AC2,@-9(AC3)
239      C049 8204 A      LD          AC0,4(AC2)
240      C04A E10F A      SKG          AC0,TNS

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241 C04B 2105 A      JMP      D2          ;DISK DRIVE #1 SELECTED
242 C04C 810B A D3:  LD        AC0,BSTAT ;DISK DRIVE #2 SELECTED
243 C04D A3FE A      ST        AC0,-2(AC3)
244 C04E 810A A      LD        AC0,BDATA
245 C04F A3FD A      ST        AC0,-3(AC3)
246 C050 210C A      JMP      D1
247 C051 8104 A D2:  LD        AC0,ASTAT
248 C052 A3FE A      ST        AC0,-2(AC3)
249 C053 8103 A      LD        AC0,ADATA
250 C054 A3FD A      ST        AC0,-3(AC3)
251 C055 2107 A      JMP      D1
252 ;
253 ;*****
254 ;
255 ;          CONSTANTS
256 ;
257 ;*****
258 ;
259 C056 7D06 A ASTAT: .WORD     X'7D06
260 C057 7D05 A ADATA: .WORD     X'7D05
261 C058 7D0A A BSTAT: .WORD     X'7D0A
262 C059 7D09 A BDATA: .WORD     X'7D09
263 C05A 0267 A TNS:   .WORD     X'267
264 C05B 7FFF A MSK:   .WORD     X'7FFF
265 C05C 004C A MTRK:  .WORD     X'4C

266 .PAGE
267 ;*****
268 ;
269 ;          LOAD HEAD, SET ERROR COUNTER TO ZERO, TEST
270 ;          READY AND FILE OPERATIONAL SIGNALS.
271 ;
272 ;*****
273 ;
274 C05D 4C00 A D1:    LI        AC0,0
275 C05E B3FE A      ST        AC0,@-2(AC3) ;HEAD LOAD
276 C05F 4C32 A      LI        AC0,50 ;SET DELAY COUNTER FOR 50MS
277 C060 5880 A E1:    ROL      AC0,128
278 C061 5880 A      ROL      AC0,128
279 C062 48FF A      AISZ     AC0,-1
280 C063 21FC A      JMP      E1
281 C064 4C00 A      LI        AC0,0
282 C065 A3E6 A      ST        AC0,-X'1A(AC3) ;SET ERROR COUNTER TO 0
283 C066 8BFE A E11:  LD        AC2,-2(AC3) ;STATUS ADDRESS
284 C067 8200 A      LD        AC0,(AC2) ;STATUS
285 C068 58FC A      ROR      AC0,4
286 C069 1309 A      BOC      BIT0,H1 ;TEST READY*
287 C06A 5801 A F1:    ROL      AC0,1
288 C06B 1309 A      BOC      BIT0,G2 ;TEST FILE INOP.*
289 C06C 4C10 A G1:    LI        AC0,X'10 ;PULSE FILE INOP.* TO RESET
290 C06D A200 A      ST        AC0,(AC2)
291 C06E 4C00 A      LI        AC0,0
292 C06F A200 A      ST        AC0,(AC2)
293 C070 8200 A      LD        AC0,(AC2)
294 C071 58FD A      ROR      AC0,3
295 C072 1302 A      BOC      BIT0,G2 ;RETEST FILE INOP.*
296 C073 4C08 A H1:    LI        AC0,SNRDY ;SYSTEM NOT READY
297 C074 2566 A      JMP      @EXB

298 .PAGE
299 ;*****
300 ;
301 ;          TEST FOR VALID TRACK COUNTER. IF THE TRACK COUNTER

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302      ;          IS NOT VALID (I.E. WITHIN 0 TO 76) THEN RE-SYNCHRONIZE
303      ;          THE DRIVE AND THE TRACK COUNTER.
304      ;
305      ;*****
306      ;
307 C075 3D81 A G2:   RCPY      AC3,AC1
308 C076 F9DF A      SKNE      AC2,ASTAT      ;SELECT CORRECT DISK DRIVE
309 C077 2102 A      JMP       I1
310 C078 49FF A      AISZ      AC1,-1
311 C079 3081 A      NOP
312 C07A 4200 A I1:   PUSH      AC2
313 C07B 3681 A      RCPY      AC1,AC2
314 C07C 8200 A      LD        AC0,(AC2)
315 C07D 61DD A      AND        AC0,MSK      ;MASK OFF BIT 15
316 C07E E1DD A      SKG       AC0,MTRK      ;VALID TRACK RANGE?
317 C07F 2102 A      JMP       K1
318 C080 4C00 A      LI        AC0,0
319 C081 A200 A      ST        AC0,(AC2)
320 C082 151C A K1:   BOC       NZRO,K2      ;TRACK COUNTER = 0?
321 C083 5600 A      XCHRS     AC2          ;CURRENT DISK ADDRESS
322 C084 8200 A K3:   LD        AC0,(AC2)
323 C085 1402 A      BOC       BIT1,N      ;TRACK COUNTER = 0?
324 C086 5600 A      XCHRS     AC2
325 C087 2117 A      JMP       K2
326 C088 4C00 A N:   LI        AC0,0
327 C089 A200 A      ST        AC0,(AC2)      ;SET DIRECTION TOWARD TRK0
328 C08A 4C04 A      LI        AC0,4
329 C08B A200 A      ST        AC0,(AC2)      ;SET STEP* LOW
330 C08C 3081 A      RCPY      AC0,AC0      ;8US DELAY
331 C08D 4C00 A      LI        AC0,0      ;4US DELAY
332 C08E A200 A      ST        AC0,(AC2)      ;SET STEP* HIGH
333 C08F 2D4F A      JSR       @DEL10M      ;DELAY 10MS
334 C090 83FC A      LD        AC0,-4(AC3)    ;AC0 GETS DIRECTION
335 C091 F9C4 A      SKNE      AC2,ASTAT      ;SELECT PROPER DISK DRIVE
336 C092 2106 A      JMP       $3
337 C093 1401 A      BOC       BIT1,$2      ;PROPER DIRECTION?
338 C094 21EF A      JMP       K3          ;YES
339 C095 48FE A $2:   AISZ      AC0,-2      ;NO, REVERSE DIRECTION
340 C096 3081 A      NOP
341 C097 A3FC A      ST        AC0,-4(AC3)
342 C098 21EB A      JMP       K3
343 C099 1301 A $3:   BOC       BIT0,$4      ;PROPER DIRECTION?
344 C09A 21E9 A      JMP       K3          ;YES
345 C09B 48FF A $4:   AISZ      AC0,-1      ;NO, REVERSE DIRECTION
346 C09C 3081 A      NOP
347 C09D A3FC A      ST        AC0,-4(AC3)
348 C09E 21E5 A      JMP       K3
349 C09F 4200 A K2:   PUSH      AC2
350 C0A0 9BF7 A      LD        AC2,0-9(AC3)
351 C0A1 8604 A      LD        AC1,4(AC2)
352 C0A2 E53D A      SKG       AC1,W267      ;CHECK FOR DRIVE 2
353 C0A3 2101 A      JMP       .+2
354 C0A4 D53C A      SUB       AC1,W268      ;OFFSET DRIVE 2 NUMBER
355 C0A5 5DFD A      SHR       AC1,3
356 C0A6 4600 A      PULL      AC2
357      ;          ;NOW GET HEAD TO TRACK...

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358      ;*****PAGE*****
359      ;*****
360      ;
361      ;          GET THE HEAD TO THE TRACK WANTED.
362      ;*****

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363      ;*****
364      ;
365 C0A7 F600 A M1:   SKNE   AC1,(AC2)      ;AT TRACK DESIRED?
366 C0A8 2139 A      JMP     P
367 C0A9 E600 A      SKG     AC1,(AC2)      ;NO,STEP-IN OR STEP-OUT?
368 C0AA 2104 A      JMP     $5             ;STEP-OUT
369 C0AB 7A00 A      ISZ     (AC2)          ;STEP-IN
370 C0AC 83FC A      LD      AC0,-4(AC3)
371 C0AD 5600 A      XCHRS   AC2
372 C0AE 211B A      JMP     S
373 C0AF 7E00 A $5:   DSZ     (AC2)          ;STEPPING-OUT
374 C0B0 3081 A      NOP
375 C0B1 83FC A      LD      AC0,-4(AC3)
376 C0B2 5600 A      XCHRS   AC2
377 C0B3 F9A2 A      SKNE   AC2,ASTAT      ;SELECT PROPER DISK DRIVE
378 C0B4 2107 A      JMP     T2             ;DRIVE 1
379 C0B5 1401 A T1:   BOC     BIT1,T4       ;DRIVE 2,OUT DIRECTION?
380 C0B6 2109 A      JMP     T5             ;YES
381 C0B7 7FFC A T4:   DSZ     -4(AC3)        ;NO,REVERSE DIRECTION
382 C0B8 3081 A      NOP
383 C0B9 7FFC A      DSZ     -4(AC3)
384 C0BA 3081 A      NOP
385 C0BB 2104 A      JMP     T5
386 C0BC 1301 A T2:   BOC     BIT0,T3       ;OUT DIRECTION?
387 C0BD 2102 A      JMP     T5             ;YES
388 C0BE 7FFC A T3:   DSZ     -4(AC3)        ;NO,REVERSE DIRECTION
389 C0BF 3081 A      NOP
390 C0C0 4C00 A T5:   LI      AC0,0
391 C0C1 A200 A      ST      AC0,(AC2)      ;SET TO STEP-OUT
392 C0C2 4C04 A U1:   LI      AC0,4
393 C0C3 A200 A      ST      AC0,(AC2)      ;SET STEP* LOW
394 C0C4 3081 A      RCPY    AC0,AC0       ;8US DELAY
395 C0C5 4C00 A      LI      AC0,0         ;4US DELAY
396 C0C6 A200 A      ST      AC0,(AC2)      ;SET STEP* HIGH
397 C0C7 2D17 A      JSR     @DEL10M       ;DELAY 10MS
398 C0C8 5600 A U2:   XCHRS   AC2
399 C0C9 21DD A      JMP     M1
400 C0CA F98B A S:    SKNE   AC2,ASTAT      ;SELECT PROPER DISK DRIVE
401 C0CB 2104 A      JMP     S2             ;DRIVE1
402 C0CC 1405 A S1:   BOC     BIT1,S5       ;DRIVE2,OUT DIRECTION?
403 C0CD 7BFC A S4:   ISZ     -4(AC3)        ;NO,REVERSE DIRECTION
404 C0CE 7BFC A      ISZ     -4(AC3)
405 C0CF 2102 A      JMP     S5
406 C0D0 1301 A S2:   BOC     BIT0,S5       ;OUT DIRECTION?
407 C0D1 7BFC A S3:   ISZ     -4(AC3)        ;NO,REVERSE DIRECTION
408 C0D2 4C08 A S5:   LI      AC0,8         ;SET TO STEP-IN
409 C0D3 A200 A      ST      AC0,(AC2)
410 C0D4 4C0C A V1:   LI      AC0,X'C
411 C0D5 A200 A      ST      AC0,(AC2)      ;SET STEP* LOW
412 C0D6 3081 A      RCPY    AC0,AC0       ;8US DELAY
413 C0D7 4C08 A      LI      AC0,8         ;4US DELAY
414 C0D8 A200 A      ST      AC0,(AC2)      ;SET STEP* HIGH
415 C0D9 2D05 A      JSR     @DEL10M       ;DELAY 10MS
416 C0DA 21ED A      JMP     U2

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417      .PAGE
418      ;*****
419      ;
420      ;      CONSTANTS
421      ;
422      ;*****
423      ;

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424 C0DB C1A3 A EXB:      .WORD    EX                ;ERROR EXIT ROUTINE POINTER
425 C0DC 0007 A W7:      .WORD    7
426 C0DD AAAA A WA:      .WORD    X'AAAA
427 C0DE 0100 A SCTS:    .WORD    256                ;SECTOR DATA WORD LENGTH
428 C0DF C24D A DEL10M:  .WORD    DELAY
429 C0E0 0267 A W267:    .WORD    0267
430 C0E1 0268 A W268:    .WORD    0268
431 ;
432 ;*****
433 ;
434 ;          READ/WRITE DECISION
435 ;
436 ;*****
437 ;
438 C0E2 9BF7 A P:      LD      AC2,0-9(AC3)          ;CALLING PARAMETERS
439 C0E3 8200 A          LD      AC0,(AC2)            ;READ/WRITE COMMAND
440 C0E4 F1F7 A          SKNE    AC0,W7              ;READ OR WRITE?
441 C0E5 213E A          JMP      P1                  ;WRITE
442 C0E6 2102 A          JMP      READ
443 ;
444 ;*****
445 ;
446 ;          CONSTANTS
447 ;
448 ;*****
449 ;
450 C0E7 C208 A CRTS:    .WORD    RDSECT
451 C0E8 C1C0 A CCRC:    .WORD    CRC

452 .PAGE
453 ;*****
454 ;
455 ;          READ TO SECTOR WANTED (USING SUBROUTINE CALL JSR @CRTS)
456 ;          THEN READ DATA FROM DISK TO RAM AND CHECK THE CRC
457 ;          OF THE RAM AGAINST THE CRC FROM THE DISK.
458 ;
459 ;*****
460 ;
461 C0E9 4600 A READ:    PULL    AC2                ;STATUS ADDRESS
462 C0EA 2DFC A          JSR     @CRTS
463 C0EB 2101 A          JMP     X1
464 C0EC 2102 A          JMP     X2
465 C0ED 4C01 A X1:     LI      AC0,MISYNC          ;ERROR STATUS: MISSING SYNC
466 C0EE 25EC A          JMP     @EXB
467 C0EF 4D05 A X2:     LI      AC1,5
468 C0F0 4300 A          PUSH   AC3
469 C0F1 9FF7 A          LD      AC3,0-9(AC3)
470 C0F2 8F02 A          LD      AC3,2(AC3)
471 C0F3 1EFF A X3:     BOC     NRDY,X3
472 C0F4 82FF A          LD      AC0,-1(AC2)
473 C0F5 49FF A          AISZ    AC1,-1
474 C0F6 21FC A          JMP     X3
475 C0F7 4C00 A          LI      AC0,0
476 C0F8 A200 A          ST      AC0,(AC2)
477 C0F9 4C01 A          LI      AC0,1
478 C0FA A200 A          ST      AC0,(AC2)
479 C0FB 4D19 A          LI      AC1,25
480 C0FC 1E09 A RR1:    BOC     NRDY,VV1
481 C0FD 8200 A          LD      AC0,(AC2)
482 C0FE 130A A          BOC     BIT0,VV2
483 C0FF 82FF A          LD      AC0,-1(AC2)
484 C100 49FF A          AISZ    AC1,-1
485 C101 21FA A          JMP     RR1
486 C102 4700 A          PULL    AC3                ;RESTORE MRAM
487 C103 4400 A          PULL    AC0                ;CLEAR STACK
488 C104 4C01 A          LI      AC0,MISYNC          ;ERROR STATUS: MISSING SYNC

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489 C105 25D5 A      JMP      @EXB
490 C106 8200 A VV1:  LD        AC0,(AC2)
491 C107 1301 A      BOC       BIT0,VV2
492 C108 21F3 A      JMP      RR1
493 C109 82FF A VV2:  LD        AC0,-1(AC2)
494 C10A 85D3 A      LD        AC1,SCTS      ;SECTOR DATA WORD LENGTH
495 C10B 1EFF A VV3:  BOC       NRDY,VV3
496 C10C 82FF A      LD        AC0,-1(AC2)
497 C10D A300 A      ST        AC0,(AC3)      ;STORE DISK DATA IN RAM
498 C10E 4B01 A VV4:  AISZ     AC3,1
499 C10F 2100 A      JMP      .+1      ;HIGH-SPEED NOP
500 C110 49FF A      AISZ     AC1,-1
501 C111 21F9 A      JMP      VV3
502 C112 1EFF A VV5:  BOC       NRDY,VV5
503 C113 82FF A      LD        AC0,-1(AC2)      ;GET CRC
504 C114 4700 A      PULL     AC3      ;GET MRAM
505 C115 4000 A      PUSH     AC0      ;GET CRC TO STACK
506 C116 4300 A      PUSH     AC3
507 C117 9FF7 A      LD        AC3,@-9(AC3)
508 C118 8F02 A      LD        AC3,2(AC3)      ;RAM BUFFER POINTER
509 C119 4200 A      PUSH     AC2      ;SAVE STATUS ADDRESS
510 C11A 2DCD A      JSR      @CCRC
511 C11B 4600 A      PULL     AC2
512 C11C 4700 A      PULL     AC3
513 C11D 4500 A      PULL     AC1
514 C11E 3482 A      RXOR     AC1,AC0
515 C11F 1177 A      BOC       ZRO,NEX1      ;NORMAL EXIT ROUTINE
516 C120 4C80 A      LI       AC0,-128      ;ERROR STATUS: RD CRC ERROR
517 C121 2589 A      JMP      @EXB
518
519 ; *****
520 ;
521 ;          CONSTANTS
522 ;
523 ; *****
524 ;
525 C122 C208 A RDSA:  .WORD     RDSECT      ;RDSECT SUBROUTINE POINTER
526 C123 C1C0 A CRCA:  .WORD     CRC        ;CRC SUBROUTINE POINTER

527 ;.PAGE
528 ; *****
529 ;
530 ;          WRITE ROUTINE.  COMPUTE THE CRC OF THE RAM TO BE
531 ;          WRITTEN TO THE DISK.  READ TO THE SECTOR WANTED USING
532 ;          THE READ TO SECTOR ROUTINE (BY JSR @RDSA).  WRITE
533 ;          THE DATA IN THE RAM BUFFER ONTO THE DISK FOLLOWED
534 ;          BY THE CRC WORD.
535 ; *****
536 ;
537 ;
538 C124 4300 A P1:    PUSH     AC3      ;MRAM ONTO STACK
539 C125 8E02 A      LD        AC3,2(AC2)      ;RAM BUFFER ADDRESS
540 C126 2DFC A      JSR      @CRCA
541 C127 4700 A      PULL     AC3      ;MRAM
542 C128 4600 A      PULL     AC2      ;STATUS ADDRESS
543 C129 4000 A      PUSH     AC0      ;CRC ONTO STACK
544 C12A 2DF7 A      JSR      @RDSA
545 C12B 2114 A      JMP      W1      ;MISSING SYNC ERROR EXIT
546 C12C 4C00 A W2:    LI       AC0,0
547 C12D A2FF A      ST        AC0,-1(AC2)
548 C12E 4C02 A      LI       AC0,2
549 C12F A200 A      ST        AC0,(AC2)      ;TURN ON WRITE ENABLE -(WREN)-

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550 C130 4500 A      PULL    AC1          ;GETS CRC
551 C131 4300 A      PUSH    AC3
552 C132 4100 A      PUSH    AC1
553 C133 9FF7 A      LD      AC3,@-9(AC3)
554 C134 8F02 A      LD      AC3,2(AC3)    ;RAM BUFFER ADDRESS
555 C135 81A7 A      LD      AC0,WA
556 C136 4D14 A      LI      AC1,20       ;PREAMBLE COUNTER
557 C137 1E01 A Y1:   BOC      WRJC,Y2     ;WAIT FOR WRJC TO GO HIGH
558 C138 21FE A      JMP      Y1
559 C139 1EFF A Y2:   BOC      WRJC,Y2     ;WAIT FOR WRJC TO GO LOW
560 C13A 49FF A      AISZ     AC1,-1
561 C13B 21FB A      JMP      Y1          ;PREAMBLE NOT FINISHED YET
562 C13C A2FF A      ST       AC0,-1(AC2)   ;WRITE SYNC CHARACTER
563 C13D 85A0 A      LD      AC1,SCTS
564 C13E 1E04 A AAL:   BOC      WRJC,AA2
565 C13F 21FE A      JMP      AAL
566 C140 4400 A W1:   PULL    AC0          ;CLEAR STACK
567 C141 4C01 A      LI      AC0,1         ;ERROR STATUS: MISSING SYNC
568 C142 2160 A      JMP      EX          ;JMP ERROR EXIT SUBROUTINE
569 C143 1EFF A AA2:   BOC      WRJC,AA2
570 C144 8300 A      LD      AC0,(AC3)     ;GET WORD FROM RAM BUFFER
571 C145 A2FF A      ST       AC0,-1(AC2)   ;WRITE WORD TO DISK
572 C146 4B01 A      AISZ     AC3,1        ;INCREMENT RAM POINTER
573 C147 2100 A      JMP      .+1          ;NOP
574 C148 49FF A CC1:   AISZ     AC1,-1
575 C149 21F4 A      JMP      AAL
576 C14A 4400 A      PULL    AC0          ;GET CRC
577 C14B 4000 A      PUSH    AC0
578 C14C 4D02 A      LI      AC1,2
579 C14D 1E01 A DD1:   BOC      WRJC,DD2
580 C14E 21FE A      JMP      DD1
581 C14F 1EFF A DD2:   BOC      WRJC,DD2
582 C150 A2FF A      ST       AC0,-1(AC2)   ;WRITE CRC
583 C151 4C00 A      LI      AC0,0
584 C152 1E01 A EE1:   BOC      WRJC,EE2
585 C153 21FE A      JMP      EE1
586 C154 1EFF A EE2:   BOC      WRJC,EE2
587 C155 A2FF A      ST       AC0,-1(AC2)   ;WRITE POSTAMBLE
588 C156 49FF A      AISZ     AC1,-1
589 C157 21FA A      JMP      EE1
590 C158 A200 A      ST       AC0,(AC2)     ;TURN OFF WREN
591 C159 4700 A      PULL    AC3          ;AC3 GETS CRC
592 C15A 5700 A      XCHRS   AC3          ;AC3 GETS MRAM

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593          .PAGE
594          ;*****
595          ;
596          ;      VERIFY THE WRITE OPERATION.  READ TO THE SECTOR WANTED
597          ;      USING THE JSR @RDSA.  VERIFY THE DATA AND CRC WORD
598          ;      FROM THE DISK AGAINST THE RAM BUFFER AND THE CRC WORD
599          ;      PASSED FROM THE WRITE ROUTINE.
600          ;*****
601          ;
602          ;
603 C15B 2DC6 A      JSR      @RDSA
604 C15C 2105 A      JMP      FF1
605 C15D 4D05 A FF2:   LI      AC1,5
606 C15E 4300 A      PUSH    AC3
607 C15F 9FF7 A      LD      AC3,@-9(AC3)    ;CALLING PARAMETER
608 C160 3F02 A      LD      AC3,2(AC3)     ;RAM BUFFER POINTER
609 C161 2103 A      JMP      GG1
610 C162 4400 A FF1:   PULL    AC0          ;CLEAR STACK

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611 C163 4C01 A      LI      AC0,1      ;ERROR STATUS: MISSING SYNC
612 C164 213E A      JMP      EX        ;JMP ERROR EXIT SUBROUTINE
613 C165 1EFF A GG1:  BOC      NRDY,GG1
614 C166 82FF A      LD      AC0,-1(AC2) ;READ HARDWARE DATA LATCH
615 C167 49FF A      AISZ     AC1,-1
616 C168 21FC A      JMP      GG1
617 C169 4C00 A      LI      AC0,0
618 C16A A200 A      ST      AC0,(AC2)
619 C16B 4C01 A      LI      AC0,1
620 C16C A200 A      ST      AC0,(AC2) ;LOOK FOR SYNC CHARACTER
621 C16D 4D19 A      LI      AC1,25
622 C16E 1E0B A HH1:  BOC      NRDY,KK1
623 C16F 8200 A      LD      AC0,(AC2) ;GET DISK STATUS
624 C170 130C A      BOC      BIT0,JJ1 ;TEST FOR RSYNC
625 C171 82FF A II:   LD      AC0,-1(AC2)
626 C172 49FF A      AISZ     AC1,-1
627 C173 21FA A      JMP      HH1
628 C174 4700 A      PULL     AC3 ;RESTORE MRAM
629 C175 4400 A      PULL     AC0 ;CLEAR STACK
630 C176 4C01 A      LI      AC0,MISYNC ;ERROR STATUS: MISSING SYNC
631 C177 212B A      JMP      EX        ;ERROR EXIT ROUTINE
632 C178 0001 A WV1:  .WORD    1
633 C179 0040 A VCER: .WORD    X'40
634 C17A 8200 A KK1:  LD      AC0,(AC2) ;GET DISK STATUS
635 C17B 1301 A      BOC      BIT0,JJ1 ;TEST FOR SYNC CHARACTER
636 C17C 21F1 A      JMP      HH1
637 C17D 82FF A JJ1:  LD      AC0,-1(AC2)
638 C17E 9517 A      LD      AC1,@PCTS ;AC1 USED AS A COUNTER
639 C17F 1EFF A JJ2:  BOC      NRDY,JJ2
640 C180 82FF A      LD      AC0,-1(AC2) ;GET DATA WORD FROM DISK
641 C181 F300 A      SKNE     AC0,(AC3) ;COMPARE TST WRD & BUF WRD
642 C182 2104 A      JMP      MM2
643 C183 4700 A MM1:  PULL     AC3 ;CLEAR STACK
644 C184 4400 A      PULL     AC0
645 C185 4C40 A      LI      AC0,X'40 ;ERROR STATUS: VERIFY ERROR
646 C186 211C A      JMP      EX        ;JMP ERROR EXIT SUBROUTINE
647 C187 CDF0 A MM2:  ADD      AC3,WV1
648 C188 49FF A      AISZ     AC1,-1
649 C189 21F5 A      JMP      JJ2
650 C18A 1EFF A NN1:  BOC      NRDY,NN1
651 C18B 82FF A      LD      AC0,-1(AC2)
652 C18C 4700 A      PULL     AC3 ;GET MRAM INTO AC3
653 C18D 4500 A      PULL     AC1 ;GET CRC WORD
654 C18E 3482 A      RXOR     AC1,AC0
655 C18F 1107 A      BOC      ZRO,NEX1 ;NORMAL EXIT ROUTINE BRANCH
656 C190 31E8 A      LD      AC0,VCER
657 C191 2111 A      JMP      EX        ;JMP ERROR EXIT SUBROUTINE
658 C192 7D02 A WD:   .WORD    X'7D02
659 C193 C066 A WD1:  .WORD    E11
660 C194 000A A WD10: .WORD    10
661 C195 003E A WD14: .WORD    14
662 C196 C0DE A PCTS: .WORD    SCTS ;POINTS TO SECTOR SIZE WORD

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663 .PAGE
664 ;*****
665 ;
666 ;      NORMAL EXIT ROUTINE
667 ;
668 ;*****
669 ;
670 C197 4D00 A NEX1:  LI      AC1,0 ;NORMAL EXIT ROUTINE
671 C198 B5F9 A      ST      AC1,@WD ;UNLOAD HEAD

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62 C199 87E6 A      LD      AC1,-X'1A(AC3) ;ERROR COUNTER
673 C19A 9BF7 A      LD      AC2,@-9(AC3)
674 C19B 4C04 A      LI      AC0,4          ;PASS STATUS
675 C19C 5D08 A      SHL     AC1,8
676 C19D 3400 A      RADD    AC1,AC0
677 C19E A203 A      ST      AC0,3(AC2)      ;STORE STATUS
678 C19F 2939 A      JSR     RESTR          ;RESTORE SUBROUTINE CALL
679 C1A0 0202 A      RTS      2             ;NORMAL RETURN TO CALLING
680                                     ;PROGRAM, DISK OPERATION
681                                     ;COMPLETE.

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682 .PAGE
683 ;*****
684 ;
685 ;          CONSTANTS
686 ;*****
687 ;
688 ;
689 C1A1 7D06 A ASTATA: .WORD  X'7D06
690 C1A2 C238 A PTEPIN: .WORD STEPIN
691 ;
692 ;*****
693 ;
694 ;          ERROR EXIT ROUTINE
695 ;*****
696 ;
697 ;
698 C1A3 87E6 A EX:      LD      AC1,-X'1A(AC3) ;ERROR COUNTER
699 C1A4 F5EF A          SKNE    AC1,WD10
700 C1A5 210A A          JMP     EXC
701 C1A6 E5EE A          SKG     AC1,WD14
702 C1A7 2113 A          JMP     EXD1
703 C1A8 5D08 A          SHL     AC1,8
704 C1A9 3400 A          RADD    AC1,AC0
705 C1AA 98F7 A          LD      AC2,@-9(AC3)
706 C1AB A203 A          ST      AC0,3(AC2)      ;STORE STATUS
707 C1AC 4C00 A          LI      AC0,0
708 C1AD B1E4 A          ST      AC0,@WD
709 C1AE 292A A          JSR     RESTR          ;RESTORE SUBROUTINE CALL
710 C1AF 0201 A          RTS      1             ;ERROR RETURN TO CALLING
711                                     ;PROGRAM, DISK OPERATION
712                                     ;COMPLETE.
713 C1B0 83FC A EXC:     LD      AC0,-4(AC3)      ;DIRECTION REGISTER
714 C1B1 F9EF A          SKNE    AC2,ASTATA
715 C1B2 2104 A          JMP     EXC3            ;DRIVE1
716 C1B3 1405 A          BOC     BIT1,EXC2      ;DRIVE2, IN OR OUT?
717 C1B4 2DED A EXC1:   JSR     @PTEPIN        ;IN
718 C1B5 293B A          JSR     STPOUT
719 C1B6 2104 A          JMP     EXD1
720 C1B7 1301 A EXC3:   BOC     BIT0,EXC2      ;LAST DIRECTION: IN OR OUT?
721 C1B8 21FB A          JMP     EXC1          ;IN
722 C1B9 2937 A EXC2:   JSR     STPOUT        ;STEP-OUT SUBROUTINE CALL
723 C1BA 297D A          JSR     STEPIN        ;STEP-IN SUBROUTINE CALL
724 C1BB 7BE6 A EXD1:   ISZ     -X'1A(AC3)      ;INCREMENT ERROR COUNTER
725 C1BC 2100 A          JMP     .+1          ;HIGH-SPEED NOP
726 C1BD 25D5 A EXD2:   JMP     @WD1

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727 .PAGE
728 ;*****
729 ;
730 ;          CRC CALCULATION SUBROUTINE
731 ;*****
732 ;

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733                                     ;
734 C1BE 1021 A POLY: .WORD X'1021          ;X**15 + X**12 + X**5 + 1
735 C1BF C0DE A SCTSA: .WORD SCTS           ;SCTS POINTER
736                                     ;
737 C1C0 0A80 A CRC: PFLG SEL
738 C1C1 4CFF A LI AC0,-1
739 C1C2 99FC A LD AC2,@SCTSA
740 C1C3 4300 A CRC3: PUSH AC3
741 C1C4 4200 A PUSH AC2
742 C1C5 8700 A LD AC1,(AC3) ;CRC4
743 C1C6 4F10 A LI AC3,16
744 C1C7 89F6 A LD AC2,POLY
745 C1C8 3000 A CRC5: RADD AC0,AC0
746 C1C9 1A03 A BOC CYOV,CRC11 ;CRC6
747 C1CA 3500 A RADD AC1,AC1 ;CRC7
748 C1CB 1A03 A BOC CYOV,CRC9 ;CRC8
749 C1CC 2103 A JMP CRC10
750 C1CD 3500 A CRC11: RADD AC1,AC1
751 C1CE 1A01 A BOC CYOV,CRC10 ;CRC12
752 C1CF 3882 A CRC9: RXOR AC2,AC0
753 C1D0 4BFF A CRC10: AISZ AC3,-1
754 C1D1 21F6 A JMP CRC5
755 C1D2 4600 A PULL AC2 ;CRC13
756 C1D3 4700 A PULL AC3
757 C1D4 4B01 A AISZ AC3,1
758 C1D5 2100 A JMP .+1 ;HIGH-SPEED NOP
759 C1D6 4AFF A AISZ AC2,-1 ;CRC15
760 C1D7 21EB A JMP CRC3
761 C1D8 0200 A RTS 0

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762                                     .PAGE
763 ;*****
764 ;
765 ; RESTORE SUBROUTINE. RESTORE REGISTERS, STACK, FLAGS
766 ; AND IEN STATUS.
767 ;
768 ;*****
769 ;
770 C1D9 4600 A RESTR: PULL AC2
771 C1DA 4D10 A LI AC1,16 ;RESTORE THE STACK
772 C1DB 4BE8 A AISZ AC3,-24
773 C1DC 2100 A JMP .+1 ;H.S. NOP
774 C1DD 8300 A RES1: LD AC0,(AC3)
775 C1DE 4000 A PUSH AC0
776 C1DF 4B01 A AISZ AC3,1
777 C1E0 2100 A JMP .+1 ;H.S. NOP
778 C1E1 49FF A RES2: AISZ AC1,-1
779 C1E2 21FA A JMP RES1
780 C1E3 83ED A LD AC0,-X'13(AC3)
781 C1E4 4000 A PUSH AC0
782 C1E5 0280 A PULLF
783 C1E6 4C01 A LI AC0,1
784 C1E7 73EF A SKAZ AC0,-X'11(AC3) ;RESTORE IEN
785 C1E8 0900 A SFLG IEN
786 C1E9 4200 A RES3: PUSH AC2
787 C1EA 3303 A LD AC0,3(AC3) ;RESTORE REGISTERS
788 C1EB 8702 A LD AC1,2(AC3)
789 C1EC 8B01 A LD AC2,1(AC3)
790 C1ED 3F00 A LD AC3,(AC3)
791 C1EE 0200 A RTS 0 ;NORMAL EXIT POINT

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792                                     .PAGE
793 ;*****

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```

794      ;
795      ;           STEP OUT ONE TRACK SUBROUTINE.
796      ;
797      ;*****+
798      ;
799 C1EF 7D06 A ASTATB: .WORD X'7D06
800 C1F0 C24D A DEL10: .WORD DELAY
801      ;
802 C1F1 4C00 A STPOUT: LI      AC0,0
803 C1F2 A200 A          ST      AC0,(AC2)      ;SET DIRECTION TO OUT
804 C1F3 4C04 A          LI      AC0,4
805 C1F4 A200 A          ST      AC0,(AC2)      ;START OF STEP PULSE
806 C1F5 3081 A          NOP
807 C1F6 4C00 A          LI      AC0,0
808 C1F7 A200 A          ST      AC0,(AC2)      ;END OF STEP PULSE
809 C1F8 2DF7 A          JSR     @DEL10        ;DELAY 10MS
810 C1F9 83FC A          LD      AC0,-4(AC3)    ;GETS DIRECTION REGISTER
811 C1FA F9F4 A          SKNE    AC2,ASTATB
812 C1FB 2106 A          JMP     SOA4           ;DRIVE1
813 C1FC 1401 A          BOC     BIT1,SOA2
814 C1FD 2109 A          JMP     SOA3
815 C1FE 48FE A SOA2:    AISZ    AC0,-2
816 C1FF 2100 A          JMP     .+1           ;H.S. NOP
817 C200 A3FC A          ST      AC0,-4(AC3)
818 C201 2105 A          JMP     SOA3
819 C202 1301 A SOA4:    BOC     BIT0,SOA1
820 C203 2103 A          JMP     SOA3
821 C204 48FF A SOA1:    AISZ    AC0,-1
822 C205 2100 A          JMP     .+1           ;H.S. NOP
823 C206 83FC A          LD      AC0,-4(AC3)
824 C207 0200 A SOA3:    RTS      0           ;NORMAL EXIT POINT

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```

825      .PAGE
826      ;*****
827      ;
828      ;           READ TO SECTOR SUBROUTINE
829      ;
830      ;*****
831      ;
832 C208 4300 A RDSECT: PUSH    AC3           ;SAVE MRAM
833 C209 9FF7 A          LD      AC3,@-9(AC3)
834 C20A 3704 A          LD      AC1,4(AC3)      ;SECTOR WANTED
835 C20B 8200 A SR1:     LD      AC0,(AC2)      ;GETS STATUS
836 C20C 5CFE A          SHR     AC0,2
837 C20D 13FD A          BOC     BIT0,SR1      ;INDEX MARK?
838 C20E 8200 A SR2:     LD      AC0,(AC2)      ;INDEX MARK FOUND
839 C20F 5CFE A          SHR     AC0,2
840 C210 1303 A          BOC     BIT0,SR9
841 C211 21FC A          JMP     SR2
842      ;
843 C212 0007 A ANMSK:   .WORD    7
844 C213 0102 A SSZ:     .WORD    258
845      ;
846 C214 65FD A SR9:     AND      AC1,ANMSK      ;MASK OUT TRACK PORTION
847 C215 4900 A          AISZ    AC1,0
848 C216 2102 A          JMP     SR3
849 C217 4700 A          PULL    AC3           ;SECTOR 0 WANTED, GET MRAM
850 C218 0201 A          RTS      1           ;NORMAL EXIT POINT
851      ;
852 C219 4C05 A SR3:     LI      AC0,5           ;COUNT 1/2WAY INTO PREAMBLE
853 C21A 1EFF A SR4:     BOC     NRDY,SR4
854 C21B 8EFF A          LD      AC3,-1(AC2)    ;RESET NRDY
855 C21C 48FF A          AISZ    AC0,-1
856 C21D 21FC A          JMP     SR4
857 C21E A200 A          ST      AC0,(AC2)
858 C21F 4C01 A          LI      AC0,1

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859 C220 A200 A      ST      AC0,(AC2)
860 C221 4F19 A      LI      AC3,25
861 C222 8200 A SR5:  LD      AC0,(AC2)
862 C223 1309 A      BOC     BIT0,SR6      ;RSYNC?
863 C224 1EFD A      BOC     NRDY,SR5
864 C225 82FF A      LD      AC0,-1(AC2)
865 C226 4BFF A      AISZ    AC3,-1
866 C227 2100 A      JMP     .+1      ;NOP
867 C228 4900 A      AISZ    AC1,0
868 C229 21F8 A      JMP     SR5
869 C22A 4700 A      PULL    AC3
870 C22B 4C01 A      LI      AC0,MISYNC
871 C22C 0200 A      RTS     0      ;ERROR EXIT POINT
872 C22D 82FF A SR6:  LD      AC0,-1(AC2)
873 C22E 8DE4 A      LD      AC3,SSZ
874 C22F 1EFF A SR7:  BOC     NRDY,SR7
875 C230 82FF A      LD      AC0,-1(AC2)
876 C231 4BFF A      AISZ    AC3,-1
877 C232 21FC A      JMP     SR7
878 C233 49FF A SR8:  AISZ    AC1,-1
879 C234 21E4 A      JMP     SR3
880 C235 4700 A      PULL    AC3
881 C236 0201 A      RTS     1      ;NORMAL EXIT POINT

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882      .PAGE
883      ;*****
884      ;
885      ;      STEP IN ONE TRACK SUBROUTINE
886      ;
887      ;*****
888      ;
889 C237 7D06 A ASTATC: .WORD   X'7D06
890      ;
891 C238 4C08 A STEPIN: LI      AC0,8
892 C239 A200 A      ST      AC0,(AC2)      ;SET DIRECTION TO IN
893 C23A 4C0C A      LI      AC0,X'C
894 C23B A200 A      ST      AC0,(AC2)      ;START OF STEP PULSE
895 C23C 3081 A      NOP
896 C23D 4C08 A      LI      AC0,8
897 C23E A200 A      ST      AC0,(AC2)      ;END OF STEP PULSE
898 C23F 290D A      JSR     DELAY
899 C240 83FC A      LD      AC0,-4(AC3)
900 C241 F9F5 A      SKNE    AC2,ASTATC
901 C242 2105 A      JMP     SIA2
902 C243 1403 A      BOC     BIT1,SIA1
903 C244 4802 A      AISZ    AC0,2
904 C245 2100 A      JMP     .+1      ;NOP
905 C246 A3FC A      ST      AC0,-4(AC3)
906 C247 0200 A SIA1:  RTS     0      ;NORMAL EXIT POINT
907 C248 13FE A SIA2:  BOC     BIT0,SIA1
908 C249 4801 A      AISZ    AC0,1
909 C24A 2100 A      JMP     .+1      ;NOP
910 C24B A3FC A      ST      AC0,-4(AC3)
911 C24C 21FA A      JMP     SIA1

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912      .PAGE
913      ;*****
914      ;
915      ;      10MS DELAY SUBROUTINE

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```

916      ;
917      ;*****
918      ;
919 C24D 4100 A DELAY: PUSH    AC1          ;SAVE AC1
920 C24E 4D0A A      LI      AC1,10       ;PASS COUNTER
921 C24F 5980 A DELAY2: ROL     AC1,128    ;500US DELAY
922 C250 5980 A      ROL     AC1,128    ;500US DELAY
923 C251 49FF A      AISZ    AC1,-1
924 C252 21FC A      JMP     DELAY2
925 C253 4500 A      PULL    AC1          ;RESTORE AC1
926 C254 0200 A      RTS     0

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927      .PAGE    'BAD SECTOR PROCESSOR'
928      .LOCAL
929      ;*****
930      ;
931      ;      CONVERT LOGICAL SECTOR NUMBER TO A PHYSICAL ONE
932      ;
933      ;*****
934      ;
935 C255 2D1F A DISK2: JSR     @TPRAM        ;FIND TOP OF RAM
936 C256 A3FB A      ST      AC0,-5(AC3)
937 C257 A7FA A      ST      AC1,-6(AC3)
938 C258 ABF9 A      ST      AC2,-7(AC3)
939 C259 4600 A      PULL    AC2          ;PARAMETER LIST ADDR
940 C25A 4200 A      PUSH    AC2
941 C25B 8A00 A      LD      AC2,(AC2)
942 C25C 8601 A      LD      AC1,1(AC2)   ;LOGICAL SECTOR NUMBER
943 C25D 3E81 A      RCPY    AC3,AC2
944 C25E D915 A      SUB     AC2,H09F     ;BAD SECTOR TABLE ADDR
945 C25F 8200 A      LD      AC0,(AC2)   ;NUMBER OF ENTRIES
946      ;
947 C260 1109 A $LOOP: BOC     ZRO,$END
948 C261 4A01 A      AISZ    AC2,1
949 C262 48FF A      AISZ    AC0,-1
950 C263 3081 A      NOP
951 C264 E600 A      SKG     AC1,(AC2)    ;COMPARE
952 C265 F600 A      SKNE    AC1,(AC2)    ;MUST ACCOUNT FOR EQUAL
953 C266 2101 A      JMP     .+2
954 C267 2102 A      JMP     $END        ;DONE
955 C268 4901 A      AISZ    AC1,1        ;CHECK NEXT SECTOR
956 C269 21F6 A      JMP     $LOOP
957      ;
958 C26A 4600 A $END:  PULL    AC2          ;FIND PARAM LIST
959 C26B 4200 A      PUSH    AC2
960 C26C 8A00 A      LD      AC2,(AC2)
961 C26D A604 A      ST      AC1,4(AC2)    ;SAVE PHYSICAL SECTOR
962 C26E 83FB A      LD      AC0,-5(AC3)
963 C26F 87FA A      LD      AC1,-6(AC3)
964 C270 8BF9 A      LD      AC2,-7(AC3)
965 C271 8FF8 A      LD      AC3,-8(AC3)
966 C272 2500 A      JMP     @.+1        ;GO TO PHYSICAL DISKIO NOW
967 C273 C00A A      .WORD   PDISK
968      ;
969 C274 009F A H09F:  .WORD   09F
970 C275 C00C A TPRAM: .WORD   TRAM

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971      .PAGE
972      ;*****
973      ;
974      ;      FIND TOP OF RAM SUBROUTINE
975      ;
976      ;*****

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DISKIO16

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977 ;
978 C276 4300 A TOPRAM: PUSH AC3 ;SAVE AC3
979 C277 8D10 A LD AC3,H28K ;START AT 28K
980 C278 A3FB A $CHK: ST AC0,-5(AC3)
981 C279 F3FB A SKNE AC0,-5(AC3)
982 C27A 2102 A JMP $COMP ;PASSED PART 1
983 ;
984 C27B DD0D A $NEXT: SUB AC3,H4K ;TRY DOWN 4K
985 C27C 21FB A JMP $CHK
986 ;
987 C27D 5000 A $COMP: CAI AC0,0 ;COMPLEMENT AND TRY
988 C27E A3FB A ST AC0,-5(AC3) ;TO BE SURE
989 C27F F3FB A SKNE AC0,-5(AC3)
990 C280 2102 A JMP $OK ;SUCCESS
991 C281 5000 A CAI AC0,0
992 C282 21F8 A JMP $NEXT ;TRY AGAIN
993 ;
994 C283 5000 A $OK: CAI AC0,0 ;RESTORE AC0
995 C284 5400 A XCHRS AC0
996 C285 A3F8 A ST AC0,-8(AC3) ;SAVE AC3 IN RAM
997 C286 4400 A PULL AC0
998 C287 0200 A RTS
999 ;
1000 C288 6FFF A H28K: .WORD X'6FFF
1001 C289 1000 A H4K: .WORD X'1000

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1002 .PAGE 'TTY/CRT INPUT-OUTPUT ROUTINES'
1003 .LOCAL
1004 ;*****
1005 ;
1006 ; TELETYPE/CRT TERMINAL INPUT/OUTPUT ROUTINES
1007 ;
1008 ;*****
1009 ; RAM ADDRESS ASSIGNMENTS
1010 ;
1011 FFFB A SAV0 = -5
1012 FFFA A SAV1 = -6
1013 FFF9 A SAV2 = -7
1014 FFF8 A SAV3 = -8
1015 FFE4 A BAUD = -01C
1016 FFE3 A BCNT = -01D
1017 ;
1018 ; EXPRESSIONS FOR THE PERIPHERAL I/O
1019 ;
1020 0038 A TTYAD = 7*8
1021 0002 A $READ = 2
1022 0003 A SEND = 3
1023 0004 A RDREN = 4
1024 0005 A $RESET = 5

```

```

1025 .PAGE
1026 ;
1027 ; THIS GET CHARACTER ROUTINE IS USED AT ALL BAUD RATES
1028 ;
1029 C28A 295B A GETC: JSR SAVE
1030 C28B 4D08 A LI AC1,8 ; INITIALIZE BIT COUNT
1031 C28C A6E3 A ST AC1,BCNT(AC2)
1032 C28D 4200 A PUSH AC2 ; SAVE MAX RAM ADDRESS
1033 C28E 0605 A GETC2: ROUT $RESET
1034 C28F 0604 A ROUT RDREN ; ENABLE READER
1035 C290 0402 A RIN $READ
1036 C291 1201 A BOC POS, +2 ; TEST FOR START BIT
1037 C292 21FD A JMP .-2

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1038 C293 8AE4 A      LD      AC2,BAUD(AC2)      ; GET BAUD RATE SELECTION
1039 C294 C97E A      ADD      AC2,DELADD      ; DELAY VECTOR BASE ADDRESS
1040 C295 2E00 A      JSR      @AC2      ; HALF-BIT DELAY
1041 C296 0402 A      RIN      $READ      ; TEST IF START BIT STILL THERE
1042 C297 1201 A      BOC      POS,LP1      ; START IF GOOD START BIT
1043 C298 21F5 A      JMP      GETC2
1044 C299 2E01 A LP1: JSR      @1(AC2)      ; FULL-BIT DELAY
1045 C29A 0402 A      RIN      $READ
1046 C29B 6170 A      AND      AC0,MASK      ; MASK UNWANTED BITS
1047 C29C 5DFF A      SHR      AC1,1
1048 C29D 3182 A      RXOR     AC0,AC1      ; ADD NEW BIT TO DATA
1049 C29E 5600 A      XCHRS    AC2      ; GET MAXRAM
1050 C29F 7EE3 A      DSZ      BCNT(AC2)
1051 C2A0 3081 A      NOP
1052 C2A1 82E3 A      LD      AC0,BCNT(AC2)      ; DECREMENT AND TEST BIT COUNT
1053 C2A2 5600 A      XCHRS    AC2
1054 C2A3 4800 A      AISZ     AC0,0
1055 C2A4 21F4 A      JMP      LP1
1056
1057 C2A5 2E01 A      JSR      @1(AC2)      ; FULL-BIT DELAY
1058 C2A6 4600 A      PULL     AC2
1059 C2A7 211F A      JMP      GEC2

1060 .PAGE
1061 ;
1062 ; THIS GET AND ECHO CHARACTER ROUTINE IS ONLY USED AT 110 BAUD
1063 ; BECAUSE OF THE CRITICAL TIMING AT THE OTHER BAUD RATES. AT THE
1064 ; THE HIGHER BAUD RATES, THE GET AND ECHO CHARACTER IS ACHIEVED
1065 ; BY GETTING THE CHARACTER WITH THE GETC ROUTINE FOLLOWED BY THE
1066 ; PUTC ROUTINE.
1067 ;
1068 C2A8 293D A GECO: JSR      SAVE
1069 C2A9 32E4 A      LD      AC0,BAUD(AC2)      ; TEST BAUD SELECT
1070 C2AA 1103 A      BOC      ZRO,GEC      ; TTY
1071 C2AB 29DF A      JSR      GETC+1      ; CRT
1072 C2AC 2500 A      JMP      @.+1
1073 C2AD C31A A      .WORD    PUTC
1074 C2AE 4D08 A GEC:  LI      AC1,8      ; INITIALIZE BIT COUNT
1075 C2AF A6E3 A      ST      AC1,BCNT(AC2)
1076 C2B0 4D00 A      LI      AC1,0
1077 C2B1 0605 A      ROUT     $RESET
1078 C2B2 0604 A GEC1: ROUT     RDREN      ; ENABLE READER
1079 C2B3 0402 A      RIN      $READ
1080 C2B4 1201 A      BOC      POS,..+2      ; TEST FOR START BIT
1081 C2B5 21FD A      JMP      .-2
1082 C2B6 2D5D A      JSR      @TDELAY      ; HALF-BIT DELAY
1083 C2B7 0402 A      RIN      $READ      ; TEST IF START BIT STILL THERE
1084 C2B8 1201 A      BOC      POS,..+2      ; START IF GOOD START BIT
1085 C2B9 21F8 A      JMP      GEC1
1086 C2BA 0603 A LP3: ROUT     SEND      ; ECHO BIT
1087 C2BB 2D59 A      JSR      @TDELAY+1      ; FULL-BIT DELAY
1088 C2BC 0402 A      RIN      $READ
1089 C2BD 614E A      AND      AC0,MASK      ; MASK UNWANTED BIT
1090 C2BE 5DFF A      SHR      AC1,1
1091 C2BF 3182 A      RXOR     AC0,AC1      ; ADD NEW BIT TO DATA
1092 C2C0 7EE3 A      DSZ      BCNT(AC2)      ; DECREMENT BIT COUNT
1093 C2C1 21F8 A      JMP      LP3
1094
1095 C2C2 0603 A      ROUT     SEND      ; ECHO LAST BIT
1096 C2C3 2D51 A      JSR      @TDELAY+1      ; FULL-BIT DELAY
1097 C2C4 4CFF A      LI      AC0,-1
1098 C2C5 0603 A      ROUT     SEND      ; SEND STOP BIT
1099 C2C6 2D4E A      JSR      @TDELAY+1      ; FULL-BIT DELAY
1100 C2C7 5DF8 A GEC2: SHR      AC1,8
1101 C2C8 3481 A      RCPY     AC1,AC0
1102 C2C9 0605 A      ROUT     $RESET

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DISKIO16

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1103      ;
1104 C2CA 8EF8 A RETURN: LD      AC3,SAV3(AC2)      ; RESTORE THE REGISTERS
1105 C2CB 86FA A          LD      AC1,SAV1(AC2)
1106 C2CC 8AF9 A          LD      AC2,SAV2(AC2)
1107 C2CD 0200 A          RTS

1108      .PAGE
1109      ;
1110      ;      DELAY ROUTINES FOR TTY, 300, AND 1200 BAUD OPERATION
1111      ;
1112 C2CE 4C09 A HDELT:  LI      AC0,9              ; HALF-BIT TIME
1113 C2CF 2101 A          JMP      .+2
1114 C2D0 4C12 A DELYT:  LI      AC0,18             ; FULL-BIT TIME
1115 C2D1 5870 A          ROL      AC0,112
1116 C2D2 48FF A          AISZ     AC0,-1
1117 C2D3 21FD A          JMP      .-2
1118 C2D4 5CD8 A          SHR      AC0,40
1119 C2D5 0200 A          RTS
1120      ;
1121      ;      ... 300 BAUD DELAY
1122      ;
1123 C2D6 4C04 A HDEL3:  LI      AC0,4              ; HALF-BIT TIME
1124 C2D7 2101 A          JMP      .+2
1125 C2D8 4C09 A DELY3:  LI      AC0,9              ; FULL-BIT TIME
1126 C2D9 5850 A          ROL      AC0,80
1127 C2DA 48FF A          AISZ     AC0,-1
1128 C2DB 21FD A          JMP      .-2
1129 C2DC 5CF4 A          SHR      AC0,12
1130 C2DD 0200 A          RTS
1131      ;
1132      ;      ... 1200 BAUD OPERATION
1133      ;
1134 C2DE 4C01 A HDEL12: LI      AC0,1              ; HALF-BIT TIME
1135 C2DF 2101 A          JMP      .+2
1136 C2E0 4C02 A DELY12: LI      AC0,2              ; FULL-BIT TIME
1137 C2E1 5850 A          ROL      AC0,80
1138 C2E2 48FF A          AISZ     AC0,-1
1139 C2E3 21FD A          JMP      .-2
1140 C2E4 5CF2 A          SHR      AC0,14
1141 C2E5 0200 A          RTS
1142      ;
1143      ;      SUBROUTINE SAVE DETERMINES THE MAXIMUM RAM AVAILABLE, SAVES
1144      ;      THE ENVIRONMENT, AND DETERMINES THE PROPER BAUD RATE TO USE.
1145      ;      OUTPUTS OF THE SUBROUTINE ARE: (AC2) MAXRAM, (AC3) TTYAD.
1146      ;      THE SELECT FLAG IS CLEARED BUT NOT RESTORED UPON EXIT FROM
1147      ;      THE PROGRAM.
1148      ;
1149 C2E6 4300 A SAVE:   PUSH     AC3              ; CALCULATE MAXRAM
1150 C2E7 8D27 A          LD      AC3,MEMTOP
1151 C2E8 4000 A TOP:    PUSH     AC0
1152 C2E9 A300 A          ST       AC0,(AC3)        ; STORE WORD INTO MEMORY AND READ BACK
1153 C2EA D300 A          SUB      AC0,(AC3)
1154 C2EB 1505 A          BOC      NZRO,INCR        ; NO RAM HERE
1155 C2EC 8300 A          LD      AC0,(AC3)        ; COMPLEMENT AND RECHECK
1156 C2ED 5000 A          CAI      AC0,0
1157 C2EE A300 A          ST       AC0,(AC3)
1158 C2EF D300 A          SUB      AC0,(AC3)
1159 C2F0 1103 A          BOC      ZRO,SREG        ; RAM FOUND
1160 C2F1 DD1E A INCR:   SUB      3,BNKSIZ        ; LOOK AT NEXT LOWER BANK
1161 C2F2 4400 A          PULL     AC0
1162 C2F3 21F4 A          JMP      TOP
1163 C2F4 4400 A SREG:   PULL     AC0              ; SAVE REGISTERS

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DISKIO16

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1164 C2F5 4B02 A      AISZ    AC3,2          ; ADJUST ADDRESS TO TOP OF BANK
1165 C2F6 A3FB A      ST      AC0,SAV0(AC3)
1166 C2F7 A7FA A      ST      AC1,SAV1(AC3)
1167 C2F8 ABF9 A      ST      AC2,SAV2(AC3)
1168 C2F9 3E81 A      RCPY    AC3,AC2
1169 C2FA 4700 A      PULL    AC3          ; RESTORE AC3
1170 C2FB AEF8 A      ST      AC3,SAV3(AC2)
1171 C2FC 0A80 A      PFLG    SEL
1172 C2FD 8D14 A      LD      AC3,STAD      ; DETERMINE PROPER BAUD RATE
1173 C2FE 8300 A      LD      AC0,(AC3)
1174 C2FF 4F04 A      LI      AC3,4        ; ASSUME 1200 TO START
1175 C300 710C A      SKAZ    AC0,BIT5
1176 C301 4F02 A      LI      AC3,2        ; 300 BAUD
1177 C302 710B A      SKAZ    AC0,BIT6
1178 C303 4F00 A      LI      AC3,0        ; TTY
1179 C304 AEE4 A      ST      AC3,BAUD(AC2) ; SAVE BAUD RATE STATUS
1180 C305 4F38 A      LI      AC3,TTYAD    ; PICK UP TTY DEVICE ADDRESS
1181 C306 82FB A      LD      AC0,SAV0(AC2)
1182 C307 0200 A      RTS
1183                ;
1184                ; THE VARIABLES NEEDED IN THIS PROGRAM
1185                ;
1186 C308 0000 A ZERO:  .WORD    0
1187 C309 0001 A ONE:  .WORD    1
1188 C30A 0080 A PBIT:  .WORD    080
1189 C30B 007F A H7F:  .WORD    07F
1190 C30C 8000 A MASK:  .WORD    08000
1191 C30D 0020 A BIT5:  .WORD    020
1192 C30E 0040 A BIT6:  .WORD    040
1193 C30F 6FFD A MEMTOP: .WORD    06FFD
1194 C310 1000 A SNKSIZ: .WORD    01000
1195 C311 C316 A BAUD3:  .WORD    TDELAY+2
1196 C312 7D02 A STAD:  .WORD    07D02      ; ADR OF BAUD SELECT WORD

1197                .PAGE
1198                ;
1199                ; TRANSFER VECTOR FOR VARIOUS DELAY ROUTINES
1200                ;
1201 C313 C314 A DELADO: .WORD    TDELAY
1202 C314 C2CE A TDELAY: .WORD    HDELT      ; TTY - HALF BIT DELAY
1203 C315 C2D0 A        .WORD    DELYT      ; FULL BIT DELAY
1204 C316 C2D6 A        .WORD    HDEL3      ; 300 BAUD
1205 C317 C2D3 A        .WORD    DELY3
1206 C318 C2DE A        .WORD    HDEL12     ; 1200 BAUD
1207 C319 C2E0 A        .WORD    DELY12

1208                .PAGE
1209                ;
1210                ; THIS PUT CHARACTER ROUTINE IS USED AT ALL BAUD RATES.
1211                ;
1212 C31A 29CB A PUTC:  JSR      SAVE
1213 C31B 4200 A      PUSH    AC2          ; SAVE MAX RAM ADDRESS
1214 C31C 8AE4 A      LD      AC2,BAUD(AC2) ; GET BAUD RATE SELECTION
1215 C31D F9EA A      SKNE    AC2,ZERO     ; TEST FOR 110 BAUD
1216 C31E 210C A      JMP     TTY          ; NO PARITY
1217                ;
1218 C31F 61EB A      AND     AC0,H7F      ; COMPUTE EVEN PARITY
1219 C320 4000 A      PUSH    AC0
1220 C321 4D01 A      LI      AC1,1
1221 C322 4F07 A      LI      AC3,7
1222 C323 1301 A PL1:  BOC     BIT0,..+2
1223 C324 4901 A      AISZ    AC1,1
1224 C325 5CFF A      SHR     AC0,1

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DISKIO16

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1225 C326 4BFF A      AISZ  AC3,-1
1226 C327 21FB A      JMP    PL1
1227 C328 4400 A      PULL  AC0
1228 C329 75DF A      SKAZ  AC1,ONE
1229 C32A 69DF A      OR     AC0,PBIT
1230
1231 C32B 4F38 A TTY:  LI     AC3,TTYAD
1232 C32C 3181 A      RCPY  AC0,AC1
1233 C32D 4C09 A      LI     AC0,9          ; LOAD BIT COUNT
1234 C32E 4000 A      PUSH  AC0
1235 C32F C9E3 A      ADD    AC2,DELADD
1236 C330 2E01 A      JSR    @1(AC2)        ; FULL-BIT DELAY
1237 C331 0603 A      ROUT  SEND
1238 C332 2E01 A LP2:  JSR    @1(AC2)        ; FULL-BIT DELAY
1239 C333 5600 A      XCHRS AC2          ; EXCHANGE INDEX ADDRESS WITH BIT COUNT
1240 C334 4AFF A      AISZ  AC2,-1        ; DECREMENT BIT COUNT
1241 C335 211D A      JMP    NEXT
1242
1243 C336 4CFF A DONE:  LI     AC0,-1          ; CHARACTER OUTPUT COMPLETED
1244 C337 0603 A      ROUT  SEND          ; SEND STOP BIT
1245 C338 4600 A      PULL  AC2          ; LOAD BAUD-RATE SELECTOR
1246 C339 2E01 A      JSR    @1(AC2)        ; FULL-BIT DELAY
1247 C33A 2E01 A      JSR    @1(AC2)        ; FULL-BIT DELAY
1248 C33B F9D5 A      SKNE  AC2,BAUD3
1249 C33C 2103 A      JMP    DON1
1250 C33D 4600 A      PULL  AC2
1251 C33E 82FB A      LD     AC0,SAV0(AC2)
1252 C33F 2189 A      JMP    RETURN-1
1253 C340 4600 A DON1:  PULL  AC2          ; RESTORE ORIGINAL CHARACTER
1254 C341 82FB A      LD     AC0,SAV0(AC2)
1255 C342 4000 A      PUSH  0
1256 C343 F10E A      SKNE  0,CR
1257 C344 2102 A      JMP    .+3
1258 C345 4400 A      PULL  0
1259 C346 2182 A      JMP    RETURN-1
1260 C347 4D08 A      LI     AC1,8          ; 190 MS. DELAY FOR CR ON SILENT-700
1261 C348 4C30 A DEL:  LI     AC0,48
1262 C349 5370 A      ROL    AC0,112
1263 C34A 48FF A      AISZ  AC0,-1
1264 C34B 21FD A      JMP    .-2
1265 C34C 5C8D A      SHR    AC0,67
1266 C34D 49FF A      AISZ  AC1,-1
1267 C34E 21F9 A      JMP    DEL
1268 C34F 4400 A      PULL  0
1269 C350 2500 A      JMP    @.+1
1270 C351 C2C9 A      .WORD  RETURN-1
1271 C352 000D A CR:   .WORD  X'0D
1272
1273 C353 59FF A NEXT:  ROR    AC1,1          ; OUTPUT NEXT BIT
1274 C354 3481 A      RCPY  AC1,AC0
1275 C355 0603 A      ROUT  SEND          ; OUTPUT ONE BIT
1276 C356 5600 A      XCHRS AC2          ; EXCHANGE BIT COUNT WITH INDEX ADDRESS
1277 C357 21DA A      JMP    LP2
1278      C01D A      .END    DISKIO

```

***** 0 ERRORS IN ASSEMBLY *****

```

$2!  $3!  $4!  $5!  $CHK" $COMP" SEND" $LIST! $LOOP" $NEXT"
C095 A C099 A C09B A C0AF A C278 A C27D A C26A A C018 A C260 A C27B A

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$OK"  $READ# $RESE# A3      A4      A5      A6      AA1      AA2      AC0

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DISKIO16

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C283 A 0002 A 0005 A C01F A C024 A C022 A C02A A C13E A C143 A 0000 A
AC1      AC2      AC3      ADATA  ANMSK  ASTAT  ASTATA  ASTATB  ASTATC  B1
0001 A 0002 A 0003 A C057 A C212 A C056 A C1A1 A C1EF A C237 A C03E A
BAUD      BAUD3    BCNT     BDATA  BIT0    BIT1    BIT5     BIT6     BNKSI2  BSAV
FFE4 A C311 A FFE3 A C059 A 0003 A 0004 A C30D A C30E A C310 A C030 A
BSTAT     C1       CC1      CCRC    CONT1   CONT2   CR       CRC      CRC10   CRC11
C058 A C046 A C148 A C0E8 A C02E A C02F A C352 A C1C0 A C1D0 A C1CD A
CRC3      CRC5     CRC9     CRCA    CRTS    CYOV    D        D1       D2      D3
C1C3 A C1C8 A C1CF A C123 A C0E7 A 000A A C048 A C05D A C051 A C04C A
DBOOT     DD1      DD2      DEL     DEL10   DEL10M  DELADD  DELAY    DELAY2  DELY12
C00E A C14D A C14F A C348 A C1F0 A C0DF A C313 A C24D A C24F A C2E0 A
DELY3     DELYT     DISK2    DISKIO  DON1    DONE    E1       E11      EE1     EE2
C2D8 A C2D0 A C255 A C01D A C340 A C336 A C060 A C066 A C152 A C154 A
ERROR     EX       EXB      EXC     EXC1    EXC2    EXC3     EXD1     EXD2    F1
C016 A C1A3 A C0DB A C1B0 A C1B4 A C1B9 A C1B7 A C1BB A C1BD A C06A A
FF1       FF2      G1       G2      GEC     GEC1    GEC2     GECO     GETC     GETC2
C162 A C15D A C06C A C075 A C2AE A C2B2 A C2C7 A C2A8 A C28A A C28E A
GG1       H09F     H1       H28K    H4K     H7F     HDEL12   HDEL3    HDELT   HH1
C165 A C274 A C073 A C288 A C289 A C30B A C2DE A C2D6 A C2CE A C16E A
I1        IEN      IEN2     II      INCR    JJ1     JJ2      K1       K2      K3
C07A A 0001 A 0009 A C171 A C2F1 A C17D A C17F A C082 A C09F A C084 A
KK1       LDISK    LP1      LP2     LP3     M1      MASK     MEMTOP   MISYNC   MM1
C17A A C008 A C299 A C332 A C2BA A C0A7 A C30C A C30F A 0001 A C183 A
MM2       MSK     MTRK     N       NEX1    NEXT    NN1      NRDY     NZRO    ONE
C187 A C05B A C05C A C088 A C197 A C353 A C18A A 000E A 0005 A C309 A
P         P1      PBIT     PCTS    PDBOOT  PDISK   PL1      POLY     POS     PTEPIN
C0E2 A C124 A C30A A C196 A C000 A C00A A C323 A C1BE A 0002 A C1A2 A
PUTC     RDREN    RDSA     RDSECT  READ    RES1    RES2     RES3     RESTR   RETURN
C31A A 0004 A C122 A C203 A C0E9 A C1DD A C1E1 A C1E9 A C1D9 A C2CA A
RR1      S       S1      S2      S3      S4      S5       SAV0     SAV1    SAV2
C0FC A C0CA A C0CC A C0D0 A C0D1 A C0CD A C0D2 A FFFB A FFFA A FFF9 A
SAV3     SAVE     SCTS     SCTSA   SEL     SEND    SIA1     SIA2     SNRDY   SOA1
FFF8 A C2E6 A C0DE A C1BF A 0002 A 0003 A C247 A C248 A 0008 A C204 A
SOA2     SOA3     SOA4     SR1     SR2     SR3     SR4      SR5      SR6     SR7
C1FE A C207 A C202 A C203 A C20E A C219 A C21A A C222 A C22D A C22F A
SR8      SR9      SREG     SSZ     STAD    STEPIN  STPOUT  T1       T2      T3
C233 A C214 A C2F4 A C213 A C312 A C238 A C1F1 A C0B5 A C0BC A C0BE A
T4       T5      TDELAY  TMPTR   TNS     TOP     TOPRAM  TPRAM    TRAM     TTY
C0B7 A C0C0 A C314 A C02D A C05A A C2E8 A C276 A C275 A C00C A C32B A
TTYAD    TTYGCO  TTYGET  TTYPUT  U1      U2      V1       VCER     VV1     VV2
0038 A C006 A C002 A C004 A C0C2 A C0C8 A C0D4 A C179 A C106 A C109 A
VV3      VV4     VV5     W1      W2      W267    W268     W7       WA      WD
C103 A C10E A C112 A C140 A C12C A C0E0 A C0E1 A C0DC A C0DD A C192 A

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DISKIO16

WD1 WD10 WD14 WRD2 WRJC WV1 X1 X2 X3 Y1
C193 A C194 A C195 A C02C A 000E A C178 A C0ED A C0EF A C0F3 A C137 A

Y2 ZERO ZRO
C139 A C308 A 0001 A

2C22 A598

MEMDI

MEMDI

REVISION-G 01/02/74
MEMDI 00154B 02/14/74

```

1 0000      .TITLE MEMDI,'00154B 02/14/74'
2 0000      ; MEMDI IMP-16L/IMP-16P MEMORY DIAGNOSTIC
3 0000      ;
4 0000      ;
5 0000      ; 1. LOAD DIAGNOSTIC INTO MAIN MEMORY.
6 0000      ;*****
7 0000      ;*
8 0000      ;* IMP-16P LOADING PROCEDURE
9 0000      ;*
10 0000     ;*****
11 0000     ;
12 0000     ; A. FROM CARDS
13 0000     ;
14 0000     ; 1) DEPRESS INITIALIZE.
15 0000     ; 2) SET MODE SWITCH TO PC.
16 0000     ; 3) SET THE VALUE X'7F00 INTO THE SWITCHES.
17 0000     ; 4) DEPRESS LOAD DATA.
18 0000     ; 5) SET MODE SWITCH TO PROG DATA.
19 0000     ; 6) DEPRESS RUN.
20 0000     ; 7) WHEN THE LOADER HALTS, SET MODE SWITCH TO PC.
21 0000     ; 8) SET THE VALUE X'120 INTO THE SWITCHES.
22 0000     ; 9) DEPRESS LOAD DATA.
23 0000     ; 10) DEPRESS RUN.
24 0000     ;
25 0000     ; B. FROM PAPER TAPE
26 0000     ;
27 0000     ; 1) PLACE PAPER TAPE IN READER.
28 0000     ; 2) DEPRESS 'INITIALIZE'.
29 0000     ; 3) DEPRESS 'LOAD PROG'.
30 0000     ; 4) UPON COMPLETION OF LOAD, PROGRAM WILL HALT. TO BEGIN
31 0000     ; EXECUTION, DEPRESS 'RUN'.

32 0000     .PAGE
33 0000     ;*****
34 0000     ;*
35 0000     ;* IMP-16L LOADING PROCEDURE
36 0000     ;*
37 0000     ;*****
38 0000     ;
39 0000     ; A. CARDS
40 0000     ; 1) PLACE CARD DECK IN READER (WITH CRBOOT).
41 0000     ; 2) DEPRESS 'INITIALIZE'.
42 0000     ; 3) DEPRESS 'AUX1'.
43 0000     ; 4) DEPRESS 'RUN'.
44 0000     ;
45 0000     ; B. PAPER TAPE
46 0000     ; 1) PLACE PAPER TAPE IN READER.
47 0000     ; 2) DEPRESS 'INITIALIZE'.
48 0000     ; 3) DEPRESS 'LOAD PROG'.
49 0000     ; 4) UPON COMPLETION OF LOAD, PROGRAM WILL HALT. TO BEGIN
50 0000     ; EXECUTION, DEPRESS 'RUN'.
51 0000     ; 2. PROGRAM SHOULD HALT WITH X'124 IN THE PC.
52 0000     ; 3. SELECT TEST PARAMETERS (IF NECESSARY).
53 0000     ; A. DEPRESS 'HALT'.
54 0000     ; B. SET MODE SWITCH TO 'AC0'.
55 0000     ; C. SET FUNCTIONS REQUESTED INTO SWITCHES.
56 0000     ; D. DEPRESS 'LOAD DATA'.
57 0000     ; E. SET MODE SWITCH TO 'AC1'.
58 0000     ; F. SET TEST START ADDRESS INTO SWITCHES.
59 0000     ; G. DEPRESS 'LOAD DATA'.
60 0000     ; H. SET MODE SWITCH TO 'AC2'.

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MEMDI

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61 0000 ; I. SET SWITCHES TO TEST END ADDRESS.
62 0000 ; J. DEPRESS 'LOAD DATA'.
63 0000 ; K. IF PROGRAM RELOCATION DESIRED, SET MODE SWITCH TO AC3.
64 0000 ; L. SET NEW PROGRAM ADDRESS INTO SWITCHES. IF THIS OPTION IS
65 0000 ; USED, TEST RANGE AND PATTERNS MUST BE REDEFINED BEFORE
66 0000 ; FURTHER TESTING IS ATTEMPTED.
67 0000 ; M. DEPRESS 'LOAD DATA'.
68 0000 ; 4. RESTART PROGRAM EXECUTION, BY DEPRESSING RUN.
69 0000 ; 5. AFTER PROGRAM AGAIN HALTS, CHECK THE ADDRESS IN THE PC.
70 0000 ; IF PC=X'124, ALL SELECTED TESTS WERE EXECUTED WITHOUT ANY ERRORS
71 0000 ; BEING DETECTED.
72 0000 ; TO REPEAT THE SELECTED TESTING, RETURN TO STEP 4 ABOVE.
73 0000 ; TO MAKE NEW TESTING SELECTIONS, RETURN TO STEP 3 ABOVE.
74 0000 ; IF PC=X'182, AN ADDRESSING ERROR HAS BEEN DETECTED. AC1 SHOULD
75 0000 ; CONTAIN A ZERO(0) INDICATING ADDRESS ERROR, AC2 SHOULD CONTAIN
76 0000 ; THE WORD READ FROM MEMORY, AND AC3 SHOULD CONTAIN THE ADDRESS
77 0000 ; REFERENCED.
78 0000 ; IF PC=X'20C, THE PROGRAM HAS DETECTED A PATTERN MISMATCH.
79 0000 ; ACO SHOULD INDICATE THE BITS WHICH FAILED, AC1 INDICATES
80 0000 ; THE TEST WHICH FAILED (SEE LISTING), AC2 WILL INDICATE THE
81 0000 ; THE ADDRESS OF THE FAILURE, AND AC3 CONTAINS THE CORRECT
82 0000 ; PATTERN. IF RUN IS DEPRESSED, THE PROGRAM WILL HALT WITH PC
83 0000 ; =X'20E AND AC1 WILL INDICATE WHICH BITS WERE UNDER TEST.
84 0000 ; TO CONTINUE AFTER AN ERROR, DEPRESS RUN.
85 0000 ;
86 0000 ;
87 0000 .TSECT
88 0000 0120 T .=.+X'120
89 0120 8179 A MEMDI: LD R0,FUNCT ;FUNCTIONS TO BE PERFORMED
90 0121 8579 A LD R1,TSTRT ;TEST START ADDRESS
91 0122 897C A LD R2,TEND ;TEST END ADDRESS
92 0123 0000 A HALT ;TO SET UP INPUT VALUES
93 0124 ;
94 0124 ; INPUTS: R0: FUNCTIONS
95 0124 ; R1: START ADDRESS
96 0124 ; R2: END ADDRESS
97 0124 ;
98 0124 ; BIT FUNCTION
99 0124 ;
100 0124 ; 0 ADDRESS TEST
101 0124 ; 1 WORD TEST
102 0124 ; 2 BIT TEST
103 0124 ; 3 HALT ON ERROR
104 0124 ; 4 LOOP ON SELECTED TESTS
105 0124 ; 5 REDEFINE PATTERN
106 0124 ; 6 LOOP ON SINGLE TEST
107 0124 ; 7 LOOP ON ERROR
108 0124 ; 8 RESET RANGE
109 0124 ;
110 0124 ; 15 RELOCATE PROGRAM (NEW ADDRESS IN R3)
111 0124 ;
112 0124 ; IF PROGRAM IS RELOCATED, ALL PATTERNS AND RANGES
113 0124 ; MUST BE REDEFINED.
114 0124 ;
115 0124 2118 A JMP A1
116 0125 ;
117 0125 ; MISCELLANEOUS CONSTANTS
118 0125 ;
119 0125 0000 A R0=0
120 0125 0001 A R1=1
121 0125 0002 A R2=2
122 0125 0003 A R3=3
123 0125 0001 A ZR0=1
124 0125 0007 A NZR0=7
125 0125 0004 A B1=4
126 0125 0003 A ODD=3

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MEMDI

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127 0125 0002 A      PZRO=2
128 0125 0005 A      NEZ=5
129 0125             ;
130 0125             ;      CONTROL VARIABLES
131 0125             ;
132 0125 0120 T PBASE: .WORD MEMDI      ;PROG START ADDRESS
133 0126 0218 T PLAST: .WORD PEND      ;PROG END ADDRESS
134 0127             ;
135 0127             ;      PATTERN CONTROL
136 0127             ;
137 0127 AAAA A PATN:  .WORD X'AAAA      ;ACTUAL PATTERN CONTENTS
138 0128 5555 A      .WORD X'5555
139 0129 0138 T      .=.+18
140 0138 0005 A MAXP:  .WORD 5          ;MAXIMUM NUMBER OF PATTERNS ALLOWED
141 013C 0127 T PPNT:  .WORD PATN      ;ABSOLUTE ADDRESS OF NEXT ENTRY IN PATN
142 013D             ;
143 013D             ;
144 013D A15C A A1:    ST      R0,FUNCT  ;REQUESTED FUNCTIONS
145 013E 1201 A      BOC      PZRO,A1A  ;RELOCATE PROGRAM?
146 013F 2149 A      JMP      A50      ;PROGRAM RELOCATION ROUTINE
147 0140 717B A A1A:  SKAZ     R0,BIT8  ;REDEFINE TEST RANGE?
148 0141 2101 A      JMP      .+2      ;YES
149 0142 2102 A      JMP      A2       ;NO
150 0143 A557 A      ST      R1,TSTRT  ;RESET TEST RANGE
151 0144 A95A A      ST      R2,TEND
152 0145 7173 A A2:  SKAZ     R0,BIT5  ;TEST PATTERN REDEFINITION BIT
153 0146 2108 A      JMP      A20
154 0147 8152 A A4:   LD      R0,FUNCT  ;TEST FOR NEXT FUNCTION
155 0148 132C A      BOC      ODD,A35  ;ADDRESS TEST
156 0149 141D A A6:   BOC      B1,A25  ;WORD TEST
157 014A 716B A A8:   SKAZ     R0,BIT2
158 014B 2122 A      JMP      A30      ;BIT TEST
159 014C 716B A A10:  SKAZ     R0,BIT4
160 014D 21F9 A      JMP      A4
161 014E 21D1 A      JMP      MEMDI    ;LOOP MODE - CONTINUE
162 014F             ;              ;NOT LOOP MODE
163 014F             ;
164 014F             ;      REDEFINE PATTERN
165 014F 815C A A20:  LD      R0,PREPL  ;PATTERN REPLICATORS
166 0150 895C A      LD      R2,PREPL+1
167 0151 9550 A      LD      R1,@PSTRT  ;PATTERN WORDS
168 0152 9D50 A      LD      R3,@PSTRT+1
169 0153 0000 A      HALT
170 0154             ;
171 0154             ;      R0 REPLICATOR 0
172 0154             ;      R1 PATTERN 1
173 0154             ;      R2 REPLICATOR 2
174 0154             ;      R3 PATTERN 2
175 0154             ;
176 0154 11F2 A      BOC      ZR0,A4   ;NO DEFINITIONS
177 0155 A156 A      ST      R0,PREPL  ;SAVE PATTERN 1
178 0156 A5D0 A      ST      R1,PATN
179 0157 85E4 A      LD      R1,PPNT
180 0158 A549 A      ST      R1,PSTRT
181 0159 4D01 A      LI      R1,1
182 015A A54C A      ST      R1,PWRDS
183 015B A540 A      ST      R1,NPAT
184 015C 3881 A      RCPY     R2,R0     ;R2 CONTAINS PATTERN 2 REPLICATOR
185 015D 11E9 A      BOC      ZR0,A4   ;NO PATTERN 2
186 015E A94E A      ST      R2,PREPL+1
187 015F ADC8 A      ST      R3,PATN+1
188 0160 89D8 A      LD      R2,PPNT
189 0161 C945 A      ADD      R2,PWRDS
190 0162 A940 A      ST      R2,PSTRT+1
191 0163 A544 A      ST      R1,PWRDS+1
192 0164 4D02 A      LI      R1,2
193 0165 A536 A      ST      R1,NPAT    ;SET NUMBER OF DEFINED PATTERNS

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194 0166 21E0 A      JMP      A4
195 0167             ;
196 0167             ;      WORD TEST
197 0167             ;
198 0167 4CFF A A25:  LI      R0,-1      ;SET MASK FOR FULL WORD
199 0168 A138 A      ST       R0,MASK
200 0169 2953 A      JSR      TESTS      ;EXECUTE WORD TESTS
201 016A 812F A      LD       R0,FUNCT
202 016B 714E A      SKAZ     R0,BIT6
203 016C 21FA A      JMP      A25      ;LOOP ON SINGLE TEST
204 016D 21DC A      JMP      A8       ;CONTINUE
205 016E             ;
206 016E             ;      BIT TEST
207 016E             ;
208 016E 4C01 A A30:  LI      R0,1      ;SET MASK FOR BIT TEST
209 016F A131 A      ST       R0,MASK
210 0170 294C A      JSR      TESTS      ;EXECUTE BIT TESTS
211 0171 8128 A      LD       R0,FUNCT
212 0172 7147 A      SKAZ     R0,BIT6
213 0173 21FA A      JMP      A30      ;LOOP ON SINGLE TEST
214 0174 21D7 A      JMP      A10      ;CONTINUE
215 0175             ;
216 0175             ;      ADDRESS TEST -- WRITE ADDRESS OF EACH MEMORY WORD INTO
217 0175             ;      WORD AND THEN READ BACK EACH ONE TO SEE IF WORD WAS
218 0175             ;      ADDRESSED PROPERLY.
219 0175             ;
220 0175 8D25 A A35:  LD       R3,TSTRT    ;STORE ADDRESSES IN EACH TEST LOC
221 0176 AF00 A A37:  ST       R3,(R3)
222 0177 4B01 A      AISZ     R3,1
223 0178 ED26 A      SKG      R3,TEND    ;COMPARE AGAINST TEST END ADDRESS
224 0179 21FC A      JMP      A37      ;CONTINUE LOOP
225 017A 8D20 A      LD       R3,TSTRT    ;TEST EACH LOC FOR ADDRESS MATCH
226 017B FF00 A A39:  SKNE     R3,(R3)    ;IF SKIP, FAILURE
227 017C 2108 A      JMP      A40      ;MATCH
228 017D 8B00 A      LD       R2,(R3)    ;R2 CONTAINS ACTUAL CONTENTS
229 017E 811B A      LD       R0,FUNCT
230 017F 4D00 A      LI       R1,0      ;TEST CODE = 0 FOR ADDR TEST
231 0180 7136 A      SKAZ     R0,BIT3    ;IF BIT 3 SET, HALT ON ERROR
232 0181 0000 A      HALT                    ;R3 CONTAINS CORRECT ADDRESS
233 0182 8117 A      LD       R0,FUNCT
234 0183 7137 A      SKAZ     R0,BIT7
235 0184 21F6 A      JMP      A39      ;LOOP ON ERROR
236 0185 4B01 A A40:  AISZ     R3,1
237 0186 ED18 A      SKG      R3,TEND
238 0187 21F3 A      JMP      A39
239 0188 21C0 A      JMP      A6       ;CONTINUE WITH NEXT TEST
240 0189             ;
241 0189             ;      RELOCATE PROGRAM TO ADDRESS CONTAINED IN R3
242 0189             ;
243 0189 819C A A50:  LD       R0,PLAST    ;CURRENT END ADDRESS
244 018A D19A A      SUB      R0,PBASE    ;CURRENT START ADDRESS
245 018B 3C00 A      RADD     R3,R0      ;CALCULATE NEW END ADDRESS
246 018C A199 A      ST       R0,PLAST    ;NEW LAST ADDRESS
247 018D 8997 A      LD       R2,PBASE    ;SAVE CURRENT STARTING ADDRESS
248 018E 81AD A      LD       R0,PPNT    ;ADJUST PATN TABLE POINTER
249 018F D195 A      SUB      R0,PBASE
250 0190 3C00 A      RADD     R3,R0
251 0191 A1AA A      ST       R0,PPNT
252 0192 AD92 A      ST       R3,PBASE    ;SET NEW BASE ADDRESS
253 0193 8200 A A55:  LD       R0,(R2)    ;MOVE PROGRAM
254 0194 A300 A      ST       R0,(R3)
255 0195 4A01 A      AISZ     R2,1
256 0196 4B01 A      AISZ     R3,1
257 0197 ED8E A      SKG      R3,PLAST
258 0198 21FA A      JMP      A55
259 0199 258B A      JMP      @PBASE    ;JUMP TO NEW STARTING LOCATION
260 019A             ;

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MEMDI

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261 019A      ;      DATA IS PLACED HERE SO IT CAN BE REACHED BY ENTIRE
262 019A      ;      PROGRAM
263 019A      ;
264 019A 000F A FUNCT: .WORD    X'F          ;FUNCTIONS TO BE PERFORMED
265 019B 0220 A TSTRT: .WORD    X'220        ;TEST START ADDRESS
266 019C 0002 A NPAT:  .WORD    2
267 019D FFFF A MIN1:  .WORD    -1
268 019E 019F T TSTAD:  .=.+1          ;CURRENT TEST ADDRESS
269 019F 1FFF A TEND:  .WORD    X'1FFF        ;TEST END ADDRESS
270 01A0 01A1 T PCNT:  .=.+1          ;NUMBER OF PATTERNS TO EXECUTE
271 01A1 01A2 T MASK:  .=.+1          ;MASK IN USE FOR TESTS
272 01A2 0127 T PSTRT: .WORD    PATN        ;PATTERN START IN PATN
273 01A3 0128 T       .WORD    PATN+1
274 01A4 01A7 T       .=.+3
275 01A7 0001 A PWRDS: .WORD    1          ;NUMBER OF WORDS IN PATTERN
276 01A8 0001 A       .WORD    1
277 01A9 01AC T       .=.+3
278 01AC 0001 A PREPL: .WORD    1          ;NUMBER OF TIMES TO REPLICATE PATTERN
279 01AD 0001 A       .WORD    1
280 01AE 01B1 T       .=.+3
281 01B1      ;
282 01B1      ;      DYNAMIC CONSTANTS FOR TEST IN PROGRESS
283 01B1      ;
284 01B1 01B2 T CMASK: .=.+1          ;MASK
285 01B2 01B3 T CWRDS: .=.+1          ;NO. OF WORDS IN PATTERN
286 01B3 01B4 T CREPLI: .=.+1        ;NO. OF TIMES TO COPY PATTERN
287 01B4 0001 A BIT0:  .WORD    1
288 01B5 0002 A BIT1:  .WORD    2
289 01B6 0004 A BIT2:  .WORD    4
290 01B7 0008 A BIT3:  .WORD    8
291 01B8 0010 A BIT4:  .WORD    16
292 01B9 0020 A BIT5:  .WORD    32
293 01BA 0040 A BIT6:  .WORD    64
294 01BB 0080 A BIT7:  .WORD    128
295 01BC 0100 A BIT8:  .WORD    256
296 01BD      ;
297 01BD      ;      EXECUTE TEST SEQUENCE
298 01BD      ;      WRITE PATTERN WORDS THROUGHOUT RANGE. THEN READ AND TEST WORD.
299 01BD      ;      COMPLEMENT AND STORE. REREAD AND CHECK, THEN RECOMPLEMENT
300 01BD      ;      AND STORE. FINALLY, REREAD AND CHECK. BIT TEST IS SAME, ONLY
301 01BD      ;      FOR ONE BIT AT A TIME.
302 01BD      ;
303 01BD      ;      .LOCAL
304 01BD 4D00 A TESTS:  LI        R1,0          ;SET FOR PASS 1
305 01BE 81DC A $11:    LD        R0,TSTRT      ;GET TEST RANGE
306 01BF A1DE A         ST        R0,TSTAD
307 01C0 8114 A $1:     LD        R0,$$4        ;SET MODIFIED INSTRUCTIONS TO ORIG VALUE
308 01C1 A108 A         ST        R0,$$4        ;REINITIALIZE MODIFIED INSTRUCTIONS
309 01C2 8110 A         LD        R0,$$2
310 01C3 A107 A         ST        R0,$$2
311 01C4 810F A         LD        R0,$$3
312 01C5 A102 A         ST        R0,$$3
313 01C6 81D5 A         LD        R0,NPAT      ;NUMBER OF DEFINED PATTERNS
314 01C7 A1D8 A         ST        R0,PCNT
315 01C8 81E3 A $3:     LD        R0,PREPL
316 01C9 A1E9 A         ST        R0,CREPLI
317 01CA 89D7 A $4:     LD        R2,PSTRT      ;GET PATTERN START ADDRESS
318 01CB 81DB A $2:     LD        R0,PWRDS      ;MOVE CURRENT PATTERN DEFN
319 01CC      ;         ;TO FIXED ITEMS
320 01CC A1E5 A         ST        R0,CWRDS
321 01CD 81D3 A $5:     LD        R0,MASK      ;GET CURRENT MASK
322 01CE A1E2 A         ST        R0,CMASK
323 01CF 75CD A         SKAZ      R1,MIN1      ;PASS 1 - R1=0
324 01D0 2105 A         JMP        $6
325 01D1 2941 A         JSR        STORE      ;STORE PATTERN THROUGH TEST REGION
326 01D2 2108 A         JMP        $7
327 01D3 81DB A $S2:    .WORD    PWRDS-$2-1&X'FF X'8100

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MEMDI

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328 01D4 81E3 A $S3: .WORD PREPL-$3-1&X'FF X'8100
329 01D5 89D7 A $S4: .WORD PSTRT-$4-1&X'FF X'8900
330 01D6 ;
331 01D6 ; RUN ACTUAL TESTS
332 01D6 ;
333 01D6 4D05 A $6: LI R1,5 ;VERIFY
334 01D7 2924 A JSR VRFY
335 01D8 293A A JSR STORE ;STORE COMPLEMENT
336 01D9 4D03 A LI R1,3 ;VERIFY COMPLEMENT
337 01DA 2921 A JSR VRFY
338 01DB 2937 A JSR STORE ;RECOMPLEMENT
339 01DC 4D01 A LI R1,1 ;VERIFY ONLY
340 01DD 291E A JSR VRFY
341 01DE 75BE A $7: SKAZ R1,MIN1 ;IF ZERO, PASS 1
342 01DF 2101 A JMP $71
343 01E0 2103 A JMP $8
344 01E1 81B8 A $71: LD R0,FUNCT
345 01E2 7103 A SKAZ R0,BIT2
346 01E3 2109 A JMP $9 ;BIT TEST
347 01E4 79B9 A $8: ISZ TSTAD ;INCREMENT TEST ADDRESS
348 01E5 4A01 A AISZ R2,1 ;INCREMENT PATTERN WORD ADDRESS
349 01E6 81B7 A LD R0,TSTAD ;FINISHED TEST RANGE?
350 01E7 E1B7 A SKG R0,TEND ;IF GREATER, YES
351 01E8 2109 A JMP $10
352 01E9 75B3 A SKAZ R1,MIN1 ;IF R1 EQ 0, PASS 1
353 01EA 0200 A RTS ;PASS 2 COMPLT, RETURN TO CALLER
354 01EB 4D01 A LI R1,1 ;SET UP FOR PASS 2
355 01EC 21D1 A JMP $11 ;START PASS 2
356 01ED ; BIT TEST
357 01ED 81C3 A $9: LD R0,CMASK ;CHANGE MASK TO NEXT BIT
358 01EE 5C01 A SHL R0,1
359 01FF 11F4 A BOC ZRO,$8 ;IF ZERO, DONE WITH ONE WORD
360 01F0 A1C0 A ST R0,CMASK
361 01F1 21E4 A JMP $6 ;TEST NEXT BIT
362 01F2 ; TEST FOR END OF REPLICATION
363 01F2 7DBF A $10: DSZ CWRDS
364 01F3 21D9 A JMP $5 ;TEST NEXT WORD
365 01F4 ; TEST FOR END OF ALL REPLICATIONS
366 01F4 7DBE A DSZ CREPLI
367 01F5 21D4 A JMP $4 ;START NEXT REPLICATION
368 01F6 ; MOVE TO NEXT TABLE ENTRY
369 01F6 79D4 A ISZ $2
370 01F7 79D0 A ISZ $3
371 01F8 79D1 A ISZ $4
372 01F9 7DA6 A DSZ PCNT ;ALL PATTERNS DONE
373 01FA 21CD A JMP $3 ;DO NEXT PATTERN
374 01FB 21C4 A JMP $1
375 01FC ;
376 01FC ;
377 01FC ; EITHER VERIFY BIT SETTING OR VERIFY COMPLEMENT SETTING. ADDRESS
378 01FC ; OF TEST WORD IN 'TSTAD', PATTERN WORD IN R2.
379 01FC ;
380 01FC .LOCAL
381 01FC 81B4 A VRFY: LD R0,CMASK ;GET CURRENT MASK
382 01FD 8E00 A LD R3,(R2) ;GET ACTUAL PATTERN WORD
383 01FE 75B6 A SKAZ R1,BIT1 ;COMPLEMENT TEST
384 01FF 3382 A $1: RXOR R0,R3 ;COMPLEMENT TEST
385 0200 919D A $2: LD R0,TSTAD ;GET CONTENTS OF MEMORY
386 0201 3C82 A RXOR R3,R0 ;COMPARE VALUES
387 0202 110D A BOC ZRO,$3 ;MEMORY WORD OK
388 0203 A50D A ST R1,$R1 ;SAVE R1
389 0204 8595 A LD R1,FUNCT
390 0205 75B1 A SKAZ R1,BIT3 ;HALT ON ERROR?
391 0206 2101 A JMP .+2 ;YES
392 0207 2107 A JMP $2A
393 0208 A909 A ST R2,$R2 ;SAVE R2
394 0209 8994 A LD R2,TSTAD
395 020A 9506 A LD R1,$R1

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MEMDI

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396 0208 0000 A      HALT
397 020C              ;
398 020C              ; R0 = BITS FAILED
399 020C              ; R1 = TEST CODE
400 020C              ; 5 REGULAR TEST
401 020C              ; 3 COMPLEMENT TEST
402 020C              ; 1 RECOMPLEMENT TEST
403 020C              ;
404 020C              ; R2 = FAILED ADDRESS
405 020C              ; R3 = CORRECT PATTERN
406 020C              ;
407 020C 85A4 A      LD      R1,CMASK      ;R1 = BITS UNDER TEST
408 020D 0000 A      HALT
409 020E 8903 A      LD      R2,$R2      ;RESTORE R2
410 020F 8501 A $2A: LD      R1,$R1      ;RESTORE R1
411 0210 0200 A $3:  RTS
412 0211 0000 A $R1: .WORD 0
413 0212 0000 A $R2: .WORD 0
414 0213              ;
415 0213              ; STORE VALUE OR COMPLEMENT OF PATTERN WORD POINTED TO BY R2
416 0213              ; INTO ADDRESS POINTED TO BY TSTAD.
417 0213              ;
418 0213 8E00 A STORE: LD      R3,(R2)      ;ACTUAL PATTERN WORD
419 0214 819C A      LD      R0,CMASK      ;GET CURRENT MASK
420 0215 75A0 A      SKAZ   R1,BIT2      ;DON'T COMPLEMENT ON SKIP
421 0216 3382 A      RXOR   R0,R3      ;COMPLEMENT
422 0217 8D86 A      ST      R3,@TSTAD    ;STORE VALUE INTO MEMORY
423 0218 0200 A PEND: RTS
424 0219              ;
425 0219              ;
426 0219 0120 T      .END    MEMDI

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***** 0 ERRORS IN ASSEMBLY *****

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$1"   $1#   $10"  $11"  $2"   $2#   $2A#   $3"   $3#   $4"
01C0 T 01FF T 01F2 T 01BE T 01CB T 0200 T 020F T 01C8 T 0210 T 01CA T

$5"   $6"   $7"   $71"  $8"   $9"   $R1#   $R2#   $S2"  $S3"
01CD T 01D6 T 01DE T 01E1 T 01E4 T 01ED T 0211 T 0212 T 01D3 T 01D4 T

$S4"  A1     A10    A1A    A2     A20    A25    A30    A35    A37
01D5 T 013D T 014C T 0140 T 0145 T 014F T 0167 T 016E T 0175 T 0176 T

A39    A4     A40    A50    A55    A6     A8     B1     BIT0    BIT1
017B T 0147 T 0185 T 0189 T 0193 T 0149 T 014A T 0004 A 01B4 T 01B5 T

BIT2   BIT3   BIT4   BIT5   BIT6   BIT7   BIT8   CMASK  CREPLI  CWRDS
01B6 T 01B7 T 01B8 T 01B9 T 01BA T 01BB T 01BC T 01B1 T 01B3 T 01B2 T

FUNCT  MASK   MAXP   MEMDI  MIN1   NEZ    NPAT   NZRO   ODD    PATN
019A T 01A1 T 013B T 0120 T 019D T 0005 A 019C T 0007 A 0003 A 0127 T

PBASE  PCNT   PEND   PLAST  PPNT   PREPL  PSTRT  PWRDS  PZRO   R0
0125 T 01A0 T 0218 T 0126 T 013C T 01AC T 01A2 T 01A7 T 0002 A 0000 A

R1     R2     R3     STORE  TEND   TESTS  TSTAD  TSTRT  VRFY   ZRO
0001 A 0002 A 0003 A 0213 T 019F T 01BD T 019E T 019B T 01FC T 0001 A

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D6FC 7E99

IMPASP8K

IMPASP8K

REVISION-G 05/16/74
IMPASP8K 0000369A 6/24/74

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1 0000          .TITLE  IMPASP8K, ' 0000369A  6/24/74'
2 0000          ;
3 0000          ;          SUBROUTINES NEEDED BY IMP 16 ASSEMBLER
4 0000          ;
5 0000          ;*****
6 0000 0001 A SIZE8=1
7 0000 FFFF A SIZE4=-SIZE8
8 0000          .ASECT
9 0000 000D A      .=0D
10 000D 0250 A      .WORD  MULT,DIVD,GETC,PUTC,RDCRD
    000E 0266 A
    000F 02A6 A
    0010 028E A
    0011 03FB A
11 0012 0013 A INBUF8: .=.+1
12 0013 0014 A INBUFE: .=.+1
13 0014 02A3 A      .WORD  ECHOGC
14 0015 0410 A      .WORD  LINIT
15 0016 0472 A      .WORD  WDSKTM
16 0017 0442 A      .WORD  WDSKOB
17 0018 04F7 A      .WORD  RDSKIN
18 0019 04F4 A      .WORD  RDSKTM
19 001A 0439 A PRINT: .WORD  HSPRT
20 001B 02E6 A      .WORD  MESS
21 001C 04DD A      .WORD  CLOSET
22 001D 045D A      .WORD  CLOSEO
23 001E 001F A DSKOBJ: .=.+1
24 001F 0020 A DSKIN:  .=.+1
25 0020 0021 A DSKTMP: .=.+1
26 0021 0022 A ABST:   .=.+1
27 0022 0023 A DSKERR: .=.+1
28 0023          .IF      SIZE8
29 0023 0250 A      .=0250 ;*****
30 0250          ;*****
31 0250 0000 A R0=0
32 0250 0001 A R1=1
33 0250 0002 A R2=2
34 0250 0003 A R3=3
35 0250 0001 A Z=1
36 0250 0002 A P=2
37 0250 0003 A ODD=3
38 0250 0004 A BLEQ1=4
39 0250 0005 A NZ=5

40 0250          .PAGE  'MULT/DIV ROUTINES'
41 0250 0002 A $PSIGN=2
42 0250 000B A $NRGT0=11
43 0250 0002 A $SELFF=2
44 0250 0003 A $BIT0=3
45 0250 0000 A AC0=0
46 0250 0001 A AC1=1
47 0250 0002 A AC2=2
48 0250 0003 A AC3=3
49 0250          ;
50 0250          ;          MAIN CALLING PROGRAM
51 0250          ;
52 0250          ;
53 0250          ;          SUBROUTINE  MULT
54 0250          ;
55 0250 A912 A MULT: ST      AC2,$S2
56 0251 AD12 A      ST      AC3,$S3
57 0252 4E00 A      LI      AC2,0          ;CLEAR AC2

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```

58 0253 4F10 A      LI      AC3,16      ;BIT COUNT=16
59 0254 5000 A      CAI      ACO,0      ;COMPLEMENT ACO TO SIMPLIFY
60 0255              ;BRANCHING ON MULTIPLIER BIT0
61 0255 0A00 A      SFLG     $SELFF     ;INCLUDE LINK IN SHIFTS
62 0256 5E01 A      SHL      AC2,1      ;CLEAR LINK
63 0257 1301 A      $LOOP:  BOC      $BIT0,.,+2 ;BRANCH IF ACO COMPLEMENTED=0
64 0258 3600 A      RADD     AC1,AC2    ;AC1+AC2 --> AC2
65 0259 5AFF A      ROR      AC2,1      ;ROTATE RESULT OF ADD INTO LINK
66 025A 5CFF A      SHR      ACO,1      ;SHIFT LINK INTO ACO
67 025B 4BFF A      AISZ     AC3,-1     ;DECR COUNT, SKIP IF ZERO
68 025C 21FA A      JMP      $LOOP
69 025D 3181 A      RCPY     ACO,AC1    ;MOVE LO ORDER RESULT TO AC1
70 025E 3881 A      RCPY     AC2,ACO    ;MOVE HI ORDER RESULT TO ACO
71 025F 8D04 A      LD       AC3,$S3
72 0260 8902 A      LD       AC2,$S2
73 0261 0A80 A      PFLG     $SELFF     ;CLEAR SELF
74 0262 0200 A      RTS
75 0263 0264 A      $S2:    .=.+1
76 0264 0265 A      $S3:    .=.+1
77 0265              ;
78 0265              ;      SUBRCUTINE DIVD
79 0265              ;
80 0265 0000 A      $COUNT: .WORD     0
81 0266 A924 A      DIVD:    ST        AC2,$SAV2 ;SAVE AC2
82 0267 3281 A      RCPY     ACO,AC2
83 0268 5001 A      CAI      ACO,1
84 0269 3C00 A      RADD     AC3,ACO    ;SUBTRACT HI ORDER FROM DIVISOR
85 026A 1B1D A      BOC      $NRGT0,$OVFLW ;IS HI ORDER >= DIVISOR
86 026B 4CF0 A      LI       ACO,-16   ;NO
87 026C A1F8 A      ST        ACO,$COUNT ;SET COUNT=16
88 026D 0A00 A      SFLG     $SELFF     ;SET SELX
89 026E 4C00 A      LI       ACO,0
90 026F 5C01 A      SHL      ACO,1      ;CLEAR LINK
91 0270 5D01 A      SHL      AC1,1
92 0271 5A01 A      $POOL:  ROL      AC2,1 ;ROTATE HI ORDER LEFT WITH LINK
93 0272 3881 A      RCPY     AC2,ACO
94 0273 5001 A      CAI      ACO,1
95 0274 3C00 A      RADD     AC3,ACO    ;SUBTRACT HI ORDER FROM DIVISOR
96 0275 1B03 A      BOC      $NRGT0,$GOES ;IS HI ORDER >= DIVISOR
97 0276 4C00 A      LI       ACO,0     ;NO
98 0277 5C01 A      SHL      ACO,1     ;CLEAR LINK
99 0278 2104 A      JMP      $SHFTLO
100 0279 5001 A      $GOES:  CAI      ACO,1 ;YES
101 027A 3281 A      RCPY     ACO,AC2    ;HI ORDER = HI ORDER - DIVISOR
102 027B 4CFF A      LI       ACO,-1
103 027C 5C01 A      SHL      ACO,1     ;SET LINK
104 027D 5901 A      $SHFTLO: ROL      AC1,1 ;ROTATE LO ORDER WITH LINK LEFT
105 027E 79E6 A      ISZ     $COUNT    ;ARE WE DONE?
106 027F 21F1 A      JMP      $POOL     ;NO
107 0280 3481 A      RCPY     AC1,ACO    ;YES
108 0281 1201 A      BOC      $PSIGN,.,+2 ;IS RESULT NEG
109 0282 2105 A      JMP      $OVFLW    ;YES, OVERFLOW
110 0283 3881 A      RCPY     AC2,ACO    ;NO MOVE REMAINDER TO ACO, QUOT
111 0284              ;IN AC1
112 0284 0A80 A      $DONE:  PFLG     $SELFF ;CLEAR SELX
113 0285 8905 A      LD       AC2,$SAV2 ;RESTORE AC2
114 0286 8D05 A      LD       AC3,$SAV3 ;RESTORE AC3
115 0287 0200 A      RTS
116 0288 8D04 A      $OVFLW: LD       AC3,$H7000
117 0289 3F00 A      RADD     AC3,AC3    ;SET OVERFLOW
118 028A 21F9 A      JMP      $DONE
119 028B 0000 A      $SAV2:  .WORD     0
120 028C 0000 A      $SAV3:  .WORD     0
121 028D 7000 A      $H7000: .WORD     X'7000

```

```

122 028E      .PAGE  'TELETYPE I/O - GETC/PUTC'
123 028E      ;      TELETYPE DELAY CCNSTANTS
124 028E 0029 A $TA   =      41
125 028E 0012 A $TB   =      18
126 028E 0070 A $TC   =     112
127 028E 0009 A $EA   =       9
128 028E 0016 A $EB   =      22
129 028E 0026 A $EC   =      38
130 028E 0038 A $TTYAD =     7*8

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```

131 028E      .SPACE  5
132 028E      ;      TELETYPE TRANSMIT CHARACTER ROUTINE
133 028E      ;
134 028E 2947 A PUTC:  JSR      SAVE
135 028F 2D12 A LPC:   JSR@    PPUTC
136 0290 2110 A        JMP      DONE+2
137 0291 4C30 A        LI       R0,030
138 0292 293F A        JSR      $DELAY+1
139 0293 4E09 A        LI       R2,9
140 0294 4F38 A        LI       R3,$TTYAD
141 0295 0603 A        ROUT     3
142 0296 293A A $LP1:  JSR      $DELAY
143 0297 5829 A        ROL      R0,$TA
144 0298 4AFF A        AISZ     R2,-1
145 0299 2101 A        JMP      .+2
146 029A 2104 A        JMP      DONE
147 029B 59FF A        ROR      R1,1
148 029C 3481 A        RCPY     R1,R0
149 029D 0603 A        ROUT     3
150 029E 21F7 A        JMP      $LP1
151 029F 4CFF A DONE:  LI       R0,-1
152 02A0 0603 A        ROUT     3
153 02A1 213D A        JMP      RET
154 02A2 7E59 A PPUTC: .WORD    07E59

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```

155 02A3      .SPACE  5
156 02A3 2932 A ECHOGC: JSR      SAVE
157 02A4 2D2A A LECO:   JSR@    PGECO
158 02A5 2127 A        JMP      $X
159 02A6      ;      GET CHARACTER ROUTINE
160 02A6 292F A GETC:  JSR      SAVE
161 02A7 2D28 A LGET:   JSR@    PGETC
162 02A8 2124 A        JMP      $X
163 02A9 0A80 A        PFLG     2
164 02AA 4F38 A        LI       R3,$TTYAD
165 02AB 0605 A $25:   ROUT     5
166 02AC 4E08 A        LI       R2,8
167 02AD 0604 A        ROUT     4
168 02AE 0402 A        RIN      2
169 02AF 1201 A        BOC      2,.,+2
170 02B0 21FD A        JMP      .-2
171 02B1 4C09 A        LI       R0,$EA
172 02B2 291F A        JSR      $DELAY+1
173 02B3 58EA A        ROR      R0,$EB
174 02B4 0402 A        RIN      2
175 02B5 1201 A        BOC      2,.,+2
176 02B6 21F4 A        JMP      $25
177 02B7 792D A $LP2:  ISZ      FLAG
178 02B8 7D2C A        DSZ      FLAG
179 02B9 2101 A        JMP      .+2

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180 02BA 0603 A      ROUT      3
181 02BB 2915 A      JSR       $DELAY
182 02BC 5826 A      ROL       R0,$EC
183 02BD 0402 A      RIN       2
184 02BE 6125 A      AND       R0,X8000
185 02BF 5DFF A      SHR       R1,1
186 02C0 3182 A      RXOR      R0,R1
187 02C1 4AFF A      AISZ      R2,-1
188 02C2 21F4 A      JMP       $LP2
189 02C3 7921 A      ISZ       FLAG
190 02C4 7D20 A      DSZ       FLAG
191 02C5 2104 A      JMP       $11
192 02C6 0603 A      ROUT      3
193 02C7 2909 A      JSR       $DELAY
194 02C8 4CFF A      LI        R0,-1
195 02C9 0603 A      ROUT      3
196 02CA          $11:
197 02CA 2906 A      JSR       $DELAY
198 02CB 5DF8 A      SHR       R1,8
199 02CC 3481 A      RCPY      R1,R0
200 02CD A10D A $X:   ST        R0,$REG
201 02CE 2110 A      JMP       RET
202 02CF 7E73 A PGECO: .WORD    07E73
203 02D0 7E3B A PGETC: .WORD    07E3B

```

```

204 02D1          .SPACE 5
205 02D1          ;      DELAY ROUTINE
206 02D1          ;
207 02D1          $DELAY:
208 02D1 4C12 A      LI        R0,$TB
209 02D2 5890 A      ROR       R0,$TC
210 02D3 48FF A      AISZ      R0,-1
211 02D4 21F0 A      JMP       .-2
212 02D5 0200 A      RTS

```

```

213 02D6          .SPACE 5
214 02D6          ;      SAVE AND RESTORE REGISTERS ROUTINE
215 02D6          ;
216 02D6 A104 A SAVE: ST        R0,$REG
217 02D7 A504 A      ST        R1,$REG+1
218 02D8 A904 A      ST        R2,$REG+2
219 02D9 AD04 A      ST        R3,$REG+3
220 02DA 0200 A      RTS
221 02DB 02DF A $REG: .=.+4
222 02DF          ;
223 02DF 81FB A RET:  LD        R0,$REG
224 02E0 85FB A      LD        R1,$REG+1
225 02E1 89FB A      LD        R2,$REG+2
226 02E2 8DFB A      LD        R3,$REG+3
227 02E3 0200 A      RTS
228 02E4          ;
229 02E4 8000 A X8000: .WORD    08000
230 02E5 02E6 A FLAG: .=.+1
231 02E6          .IF      SIZE8

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232 02E6                .PAGE  'OUTPUT TITLE MESSAGE'
233 02E6                ;
234 02E6 4D17 A MESS:   LI      1,23
235 02E7 4C0A A        LI      0,X'0A
236 02E8 2C1A A        JSR     @PRINT
237 02E9 49FF A        AISZ    1,-1
238 02EA 21FD A        JMP     .-2
239 02EB 8917 A        LD      2,HEAD
240 02EC 8600 A        LD      1,(2)
241 02ED 4A01 A        AISZ    2,1
242 02EE 2908 A        JSR     TYPE
243 02EF 3E81 A        RCPY    3,2
244 02F0 4A04 A        AISZ    2,4
245 02F1 4D0E A        LI      1,14
246 02F2 2904 A        JSR     TYPE
247 02F3 4C0D A        LI      0,X'0D
248 02F4 2C1A A        JSR     @PRINT
249 02F5 4C0C A        LI      0,X'0C
250 02F6 241A A        JMP     @PRINT
251 02F7                ;
252 02F7 8200 A TYPE:   LD      0,(2)
253 02F8 5808 A        ROL     0,8
254 02F9 6908 A        OR      R0,X80
255 02FA 2C1A A        JSR     @PRINT
256 02FB 8200 A        LD      0,(2)
257 02FC 6905 A        OR      R0,X80
258 02FD 2C1A A        JSR     @PRINT
259 02FE 4A01 A        AISZ    2,1
260 02FF 49FF A        AISZ    1,-1
261 0300 21F6 A        JMP     TYPE
262 0301 0200 A        RTS
263 0302 0080 A X80:   .WORD    080

264 0303                .PAGE  'MESSAGE'
265 0303                ;
266 0303 0304 A HEAD:   .WORD    .+1
267 0304 0039 A        .WORD    BOTTOM-.
268 0305 2020 A        .ASCII   '      NATIONAL SEMICONDUCTOR'
      0306 2020 A
      0307 2020 A
      0308 204E A
      0309 4154 A
      030A 494F A
      030B 4E41 A
      030C 4C20 A
      030D 5345 A
      030E 4D49 A
      030F 434F A
      0310 4E44 A
      0311 5543 A
      0312 544F A
      0313 5220 A
269 0314 0D0A A        .WORD    0D0A
270 0315 0D0A A        .WORD    0D0A
271 0316 0D0A A        .WORD    0D0A
272 0317 2020 A        .ASCII   '      IMP-16 '
      0318 2020 A
      0319 2020 A
      031A 2020 A
      031B 2020 A
      031C 2020 A
      031D 2020 A
      031E 2049 A
      031F 4D50 A
      0320 2D31 A
      0321 3620 A

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273 0322 0D0A A      .WORD 0D0A
274 0323 0D0A A      .WORD 0D0A
275 0324 0D0A A      .WORD 0D0A
276 0325 2020 A      .ASCII '      RESIDENT ASSEMBLER'
      0326 2020 A
      0327 2020 A
      0328 2020 A
      0329 2052 A
      032A 4553 A
      032B 4944 A
      032C 454E A
      032D 5420 A
      032E 4153 A
      032F 5345 A
      0330 4D42 A
      0331 4C45 A
      0332 5220 A
277 0333 0D0A A      .WORD 0D0A
278 0334 0D0A A      .WORD 0D0A
279 0335 0D0A A      .WORD 0D0A
280 0336 0D0A A      .WORD 0D0A
281 0337 0D0A A      .WORD 0D0A
282 0338 0D0A A      .WORD 0D0A
283 0339 0D0A A      .WORD 0D0A
284 033A 5449 A      .ASCII 'TITLE:'
      033B 544C A
      033C 453A A
285 033D 2000 A BOTTOM: .WORD 02000

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286 033E          .PAGE 'CARD INPUT ROUTINE - RDCRD'
287 033E          ;
288 033E 0012 A    $BBUF=INBUFB
289 033E 0013 A    $EBUF=INBUFE
290 033E 038E A    $BUF2: .+=+80
291 038E          ;
292 038E          ;      ASCII CODE TABLE
293 038E          ;
294 038E 0000 A    $ASCTBL: .WORD 0,0482,6,042,0442,0222,0800,012
      038F 0482 A
      0390 0006 A
      0391 0042 A
      0392 0442 A
      0393 0222 A
      0394 0800 A
      0395 0012 A
295 0396 0812 A      .WORD 0812,0412,0422,080A,0242,0400,0842,0300
      0397 0412 A
      0398 0422 A
      0399 080A A
      039A 0242 A
      039B 0400 A
      039C 0842 A
      039D 0300 A
296 039E 0200 A      .WORD 0200,0100,080,040,020,010,8,4,2,1
      039F 0100 A
      03A0 0080 A
      03A1 0040 A
      03A2 0020 A
      03A3 0010 A
      03A4 0008 A
      03A5 0004 A
      03A6 0002 A
      03A7 0001 A
297 03A8 0082 A      .WORD 082,040A,0822,0A,020A
      03A9 040A A
      03AA 0822 A
      03AB 000A A
      03AC 020A A

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298 02AD 0206 A $QM: .WORD 0206,022
    03AE 0022 A
299 03AF 0900 A .WORD 0900,0880,0840,0820,C810,0808,0804,0802,0801
    03B0 0880 A
    03B1 0840 A
    03B2 0820 A
    03B3 0810 A
    03B4 0808 A
    03B5 0804 A
    03B6 0802 A
    03B7 0801 A
300 03B8 0500 A .WORD 0500,0480,0440,0420,0410,0408,0404,0402,0401
    03B9 0480 A
    03BA 0440 A
    03BB 0420 A
    03BC 0410 A
    03BD 0408 A
    03BE 0404 A
    03BF 0402 A
    03C0 0401 A
301 03C1 0280 A .WORD 0280,0240,0220,0210,0208,0204,0202,0201
    03C2 0240 A
    03C3 0220 A
    03C4 0210 A
    03C5 0208 A
    03C6 0204 A
    03C7 0202 A
    03C8 0201 A
302 03C9 0882 A .WORD 0882,0282,0806,0406,0212,0102
    03CA 0282 A
    03CB 0806 A
    03CC 0406 A
    03CD 0212 A
    03CE 0102 A
303 03CF ;
304 03CF 0000 A INERR: HALT ; TRANSMISSION ERROR
305 03D0 4C01 A LI 0,1
306 03D1 2101 A JMP .+2
307 03D2 ;
308 03D2 4C00 A FIRS2: LI 0,0
309 03D3 A123 A ST 0,FSTCD
310 03D4 ;
311 03D4 8122 A RDCARD: LD 0,FSTCD
312 03D5 15CF A BOC NZRO,FIRST
313 03D6 4F10 A LI 3,CRADDR
314 03D7 2104 A WTLOOP: JMP .+5
315 03D8 711F A SKAZ 0,HCO
316 03D9 21F5 A JMP INERR
317 03DA 5CFE A SHR 0,2
318 03DB 14FB A BOC BIT1,WTLOOP ; BRANCH IF BUSY
319 03DC 8C12 A LD 3,$BBUF ; MOVE DATA
320 03DD 8918 A LD 2,$BBUF2
321 03DE 4D50 A LI 1,80
322 03DF 8200 A $1: LD 0,(2)
323 03E0 A300 A ST 0,(3)
324 03E1 4A01 A AISZ 2,1
325 03E2 4B01 A AISZ 3,1
326 03E3 49FF A AISZ 1,-1
327 03E4 21FA A JMP $1
328 03E5 ;
329 03E5 4F10 A FIRST: LI 3,CRADDR
330 03E6 2100 A JMP .+1
331 03E7 5CFF A SHR 0,1
332 03E8 1405 A BOC BIT1,ONLN ; BRANCH IF ONLINE
333 03E9 810D A OFFLN: LD 0,FSTCD ; CARD READER IS OFFLINE

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334 03EA 1503 A      BOC      NZRO,ONLN
335 03EB 4C01 A      LI       0,1
336 03EC A10A A      ST       0,FSTCD
337 03ED 0200 A      RTS
338 03EE          ;
339 03EE 8107 A      ONLN: LD    0,BBUF2
340 03EF 3281 A      RCPY     0,2
341 03F0 2D04 A      JSR      @RDCRDP
342 03F1 210D A      JMP      INERR
343 03F2 8104 A      LD       0,FSTCD
344 03F3 15DE A      BOC      NZRO,FIRS2      ; BRANCH IF FIRST CARD
345 03F4 0200 A      RTS
346 03F5          ;
347 03F5 7FD3 A      RDCRDP: .WORD 07FD3
348 03F6 033E A      BBUF2: .WORD $BUF2
349 03F7 0001 A      FSTCD: .WORD 1
350 03F8 00C0 A      HCO:    .WORD X'C0
351 03F9          ;
352 03F9 0004 A      BIT1     =      4
353 03F9 0005 A      NZRO     =      5
354 03F9 0001 A      STATUS   =      1
355 03F9 0002 A      STNDRD   =      2
356 03F9 000C A      POA      =     12
357 03F9 0010 A      CRADDR   =     2*8
358 03F9 0048 A      HSPAD    =     9*8
359 03F9 02D6 A      ASAVE1: .WORD SAVE
360 03FA 02DF A      ARET1:  .WORD RET
361 03FB          ;
362 03FB 2DFD A      RDCRD: JSR    @ASAVE1
363 03FC 29D7 A      JSR      RDCARD
364 03FD 8C12 A      LD       R3,$BBUF
365 03FE 8300 A      $GETCOL: LD    R0,0(R3)
366 03FF 890F A      LD       R2,$BASCI
367 0400 F200 A      $CMPRE: SKNE R0,0(R2)
368 0401 2104 A      JMP      $FOUND
369 0402 4A01 A      AISZ     R2,1
370 0403 E90A A      SKG      R2,$EASCI
371 0404 21FB A      JMP      $CMPRE
372 0405 8907 A      LD       R2,PNTQM
373 0406 D908 A      $FOUND: SUB   R2,$BASCI
374 0407 4A20 A      AISZ     R2,X'20
375 0408 AB00 A      ST       R2,0(R3)
376 0409 4801 A      AISZ     R3,1
377 040A EC13 A      SKG      R3,$EBUF
378 040B 21F2 A      JMP      $GETCOL
379 040C 25ED A      JMP      @ARET1
380 040D 03AD A      PNTQM: .WORD $QM
381 040E 03CE A      $EASCI: .WORD $ASCTBL+64
382 040F 038E A      $BASCI: .WORD $ASCTBL
383 0410          .ENDIF

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384 0410          .PAGE   '16L INITIALIZATION ROUTINE'
385 0410          ;
386 0410          ; 16L INITIALIZATION ROUTINE
387 0410          ;
388 0410          LINIT:
389 0410          .IF      SIZE8
390 0410 8117 A      LD       0,WAIT
391 0411 A1C5 A      ST       0,WTLOOP
392 0412 A1D3 A      ST       0,FIRST+1
393 0413 8115 A      LD       0,FIRST2
394 0414 A1D2 A      ST       0,FIRST+2
395 0415 8114 A      LD       0,LONLN
396 0416 A1D8 A      ST       0,ONLN+1
397 0417 8113 A      LD       0,LONLN+1
398 0418 A1D7 A      ST       0,ONLN+2
399 0419 8112 A      LD       0,LONLN+2

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400 041A A1D6 A      ST      0,ONLN+3
401 041B             .ENDIF
402 041B             ;
403 041B 8111 A      LD      R0,LPCC
404 041C B116 A      ST      R0,@LLL
405 041D 8110 A      LD      R0,LPCC+1
406 041E B115 A      ST      R0,@LLL+1
407 041F             ;
408 041F 810F A      LD      R0,LECO
409 0420 B114 A      ST      R0,@LLL+2
410 0421 810E A      LD      R0,LECO+1
411 0422 B113 A      ST      R0,@LLL+3
412 0423             ;
413 0423 810D A      LD      R0,LGETC
414 0424 B112 A      ST      R0,@LLL+4
415 0425 810C A      LD      R0,LGETC+1
416 0426 B111 A      ST      R0,@LLL+5
417 0427 0200 A      RTS
418 0428             ;
419 0428             .IF      SIZE8
420 0428 0401 A WAIT: RIN      STATUS
421 0429 5CFF A FIRTS2: SHR     0,1
422 042A 0602 A LONLN: ROUT     STNDRD
423 042B 1C01 A      BOC      POA,.,+2
424 042C 21FD A      JMP      .-2
425 042D             .ENDIF
426 042D             ;
427 042D 3181 A LPCC:  RCPY     R0,R1
428 042E 0A80 A      PFLG     2
429 042F             ;
430 042F 4F00 A LECOC: LI      R3,0
431 0430 2102 A      JMP      .+3
432 0431             ;
433 0431 4F01 A LGETC: LI      R3,1
434 0432 AD3C A      ST      R3,.,+X'3D
435 0433 028F A LLL:  .WORD     LPC,LPC+1,LECO,LECO+1,LGET,LGET+1
      0434 0290 A
      0435 02A4 A
      0436 02A5 A
      0437 02A7 A
      0438 02A8 A
436 0439             .IF      SIZE8

437 0439             .PAGE     'HIGH SPEED PRINTER OUTPUT ROUTINE'
438 0439             ;
439 0439 2D65 A HSPRT: JSR      @ASAVE
440 043A 4F48 A      LI      3,HSPAD
441 043B 0607 A      ROUT     7 ; OUTPUT ASCII CHARACTER
442 043C 1C01 A      BOC      POA,.,+2
443 043D 21FD A      JMP      .-2
444 043E 0401 A      RIN      STATUS
445 043F 1401 A      BOC      BIT1,.,+2
446 0440 21FD A      JMP      .-2
447 0441 255C A      JMP      @ARET

448 0442             .PAGE     'DISK I/O'
449 0442             .LOCAL
450 0442             ;
451 0442             ; WRITE DISK OBJECT RECORD
452 0442             ;
453 0442             ; (R1)= ADDRESS OF BUFFER CONTAINING OBJECT RECORD
454 0442             ;
455 0442 2D5C A WDSKOB: JSR      @ASAVE
456 0443 801E A      LD      R0,DSKOBJ
457 0444 6111 A      AND      R0,$4000

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458 0445 1506 A      BOC      NZ,$100
459 0446 801E A      LD      RO,DSKOBJ
460 0447 A11B A      ST      RO,DOBS
461 0448 690D A      OR      RO,$4000
462 0449 A01E A      ST      RO,DSKOBJ
463 044A 8119 A      LD      RO,ADOBBF
464 044B A178 A      ST      RO,DOBW
465 044C 3781 A $100: RCPY      R1,R3
466 044D 8700 A      LD      R1,0(R3)
467 044E 657C A      AND      R1,XFF
468 044F 4902 A      AISZ      R1,2
469 0450 8300 A $101: LD      RO,0(R3)
470 0451 2905 A      JSR      $STOB      ; STORE OBJECT WORD
471 0452 4801 A      AISZ      R3,1
472 0453 49FF A      AISZ      R1,-1
473 0454 21FB A      JMP      $101
474 0455 2548 A      JMP      @ARET
475 0456 4000 A $4000: .WORD    04000
476 0457      ;
477 0457      ;      STORE OBJECT WORD (FROM RO)
478 0457      ;      (SAVE R1,R3)
479 0457      ;
480 0457 896C A $STOB: LD      R2,DOBW
481 0458 A200 A      ST      RO,0(R2)
482 0459 796A A      ISZ      DOBW
483 045A F96D A      SKNE      R2,DOBMX
484 045B 2101 A      JMP      .+2
485 045C 0200 A      RTS
486 045D      ;
487 045D      ;      WRITE OR CLOSE DECK OBJECT FILE
488 045D      ;
489 045D      ;      CLOSEO:
490 045D 4100 A      PUSH      R1
491 045E 4300 A      PUSH      R3
492 045F 4CFA A      LI      RO,-6
493 0460 A174 A      ST      RO,$CNT
494 0461 203E A $202: JSR      @ADSKIO
495 0462 0007 A      .WORD      7
496 0463 0464 A DOBS:  .=. +1
497 0464 0580 A ADOBBF: .WORD      DOBUF
498 0465 0466 A $201:  .=. +1
499 0466 0467 A      .=. +1
500 0467 3081 A      NOP
501 0468 81FC A      LD      RO,$201
502 0469 2964 A      JSR      $ERCK
503 046A 21F6 A      JMP      $202
504 046B 79F7 A      ISZ      DOBS
505 046C 81F7 A      LD      RO,ADOBBF
506 046D A156 A      ST      RO,DOBW
507 046E 4700 A      PULL      R3
508 046F 4500 A      PULL      R1
509 0470 81F2 A      LD      RO,DOBS
510 0471 0200 A      RTS
511 0472      ;
512 0472      ;      WRITE DISK TEMPORARY (FROM INBUF)
513 0472      ;
514 0472 2D2C A WDSKTM: JSR      @ASAVE
515 0473 8020 A      LD      RO,DSKTMP
516 0474 3181 A      RCPY      RO,R1
517 0475 6154 A      AND      RO,X4000
518 0476 1508 A      BOC      NZ,$50
519 0477 A56B A      ST      R1,DTMS
520 0478 6D51 A      OR      R1,X4000
521 0479 A420 A      ST      R1,DSKTMP
522 047A 4C00 A      LI      RO,0
523 047B A15C A      ST      RO,LNUM
524 047C A15E A      ST      RO,INHALF
525 047D 8148 A      LD      RO,ADINB

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526 047E A143 A      ST      RO,DTMW
527 047F 7958 A $50:  ISZ      LNUM
528 0480 8557 A      LD      R1,LNUM
529 0481 291F A      JSR      $STR2
530 0482 8C12 A      LD      R3,INBUFB
531 0483 4C00 A $53:  LI      RO,0      ; NUM OF BLANKS
532 0484 8700 A $54:  LD      R1,0(R3)
533 0485 F547 A      SKNE     R1,BLANK
534 0486 210C A      JMP      $51      ; ANOTHER BLANK
535 0487 1103 A      BOC      Z,$52      ; NO PRECEDING BLANKS
536 0488 C14D A      ADD      RO,HEX80
537 0489 2924 A      JSR      $STR1
538 048A 21F8 A      JMP      $53
539 048B 3481 A $52:  RCPY     R1,RO
540 048C F110 A      SKNE     RO,$CR
541 048D 210C A      JMP      $60
542 048E 291F A      JSR      $STR1
543 048F FC13 A      SKNE     R3,INBUFE
544 0490 2109 A      JMP      $60      ; FINISHED
545 0491 4B01 A      AISZ     R3,1
546 0492 21F0 A      JMP      $53
547 0493 4801 A $51:  AISZ     RO,1
548 0494 FC13 A      SKNE     R3,INBUFE
549 0495 2102 A      JMP      $55
550 0496 4B01 A      AISZ     R3,1
551 0497 21EC A      JMP      $54
552 0498 C13D A $55:  ADD      RO,HEX80
553 0499 2914 A      JSR      $STR1
554 049A      ;      FINISHED
555 049A 4D0D A $60:  LI      R1,0D
556 049B 2905 A      JSR      $STR2
557 049C 2501 A      JMP      @ARET
558 049D      ;
559 049D 000D A $CR:  .WORD    OD
560 049E 02DF A ARET:  .WORD    RET
561 049F 02D6 A A SAVE: .WORD    SAVE
562 04A0 054C A ADSKIO: .WORD    DSKIO
563 04A1      ;
564 04A1      ;      STORE 2 CHAR FROM R1 (SAVE R3)
565 04A1      ;
566 04A1 8920 A $STR2: LD      R2,DTMW
567 04A2 8138 A      LD      RO,INHALF
568 04A3 1305 A      BOC      ODD,$70
569 04A4 A600 A      ST      R1,0(R2)
570 04A5 F91B A      SKNE     R2,DINMX
571 04A6 2105 A      JMP      $71
572 04A7 791A A      ISZ      DTMW
573 04A8 0200 A      RTS
574 04A9 4C00 A $70:  LI      RO,0
575 04AA 2903 A      JSR      $STR1
576 04AB 21F5 A      JMP      $STR2
577 04AC 2930 A $71:  JSR      $WRIT
578 04AD 0200 A      RTS
579 04AE      ;
580 04AE      ;      STORE 1 CHAR FROM RO (SAVE R1,R3)
581 04AE      ;
582 04AE 4000 A $STR1: PUSH     RO
583 04AF 8912 A      LD      R2,DTMW
584 04B0 812A A      LD      RO,INHALF
585 04B1 1305 A      BOC      ODD,$80
586 04B2 4400 A      PULL     RO
587 04B3 5C08 A      SHL      RO,8
588 04B4 A200 A      ST      RO,0(R2)
589 04B5 7925 A      ISZ      INHALF
590 04B6 0200 A      RTS
591 04B7 4400 A $80:  PULL     RO
592 04B8 C200 A      ADD      RO,0(R2)
593 04B9 A200 A      ST      RO,0(R2)

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594 048A F906 A      SKNE      R2,DINMX
595 048B 2103 A      JMP        $81
596 048C 7905 A      ISZ        DTMW
597 048D 791D A      ISZ        INHALF
598 048E 0200 A      RTS
599 048F 291D A $81:   JSR        $WRIT
600 04C0 0200 A      RTS
601 04C1 067F A DINMX: .WORD    DINB+127
602 04C2 04C3 A DTMW:  .=.+1
603 04C3 04C4 A DINW:  .=.+1
604 04C4 04C5 A DOBW:  .=.+1
605 04C5 001F A ADSKIN: .WORD    DSKIN
606 04C6 0600 A ADINB:  .WORD    DINB
607 04C7 067F A DINWMX: .WORD    DINB+127
608 04C8 05FF A DOBMX:  .WORD    DOBUF+127
609 04C9 000D A X0D:   .WORD    0D
610 04CA 4000 A X4000: .WORD    04000
611 04CB 00FF A XFF:   .WORD    OFF
612 04CC 007F A X7F:   .WORD    07F
613 04CD 0020 A BLANK:  .WORD    020
614 04CE      ;
615 04CE 8908 A $ERCK:  LD        R2,K4
616 04CF 3882 A      RXOR      R2,R0
617 04D0 1501 A      BOC       NZ,+.2
618 04D1 0201 A      RTS        1
619 04D2 7902 A      ISZ        $CNT
620 04D3 0200 A      RTS
621 04D4 2422 A      JMP        @DSKERR
622 04D5 0000 A $CNT:  .WORD    0
623 04D6 0080 A HEX80: .WORD    080
624 04D7 0004 A K4:   .WORD    4
625 04D8 04D9 A LNUM:  .=.+1
626 04D9 04DA A BUFPTR: .=.+1
627 04DA 04DB A IBLKCT: .=.+1
628 04DB 04DC A INHALF: .=.+1      ; EVEN=LEFT, ODD=RIGHT
629 04DC 0020 A ADSKTM: .WORD    DSKTMP
630 04DD      ;
631 04DD      ;      WRITE TEMP BUFFER TO DISK (SAVE R1,R3)
632 04DD      ;
633 04DD      $WRIT:
634 04DD      ;      CLOSE TEMP FILE
635 04DD      CLOSET:
636 04DD 4100 A      PUSH      R1
637 04DE 4300 A      PUSH      R3
638 04DF 4CFA A      LI        R0,-6
639 04E0 A1F4 A      ST        R0,$CNT
640 04E1 2DBE A $W2:   JSR        @ADSKIO
641 04E2 0007 A      .WORD    7      ; WRITE
642 04E3 04E4 A DTMS:  .=.+1      ; LOGICAL SECTOR
643 04E4 0600 A      .WORD    DINB      ; BUFFER
644 04E5 04E6 A $W1:  .=.+1      ; STATUS
645 04E6 04E7 A      .=.+1      ; PHYSICAL SECTOR
646 04E7 3081 A      NOP          ; ERROR RETURN
647 04E8 81FC A      LD        R0,$W1
648 04E9 29E4 A      JSR        $ERCK
649 04EA 21F6 A      JMP        $W2
650 04EB 79F7 A      ISZ        DTMS
651 04EC 4C00 A      LI        R0,0
652 04ED A1ED A      ST        R0,INHALF
653 04EE 81D7 A      LD        R0,ADINB
654 04EF A1D2 A      ST        R0,DTMW
655 04F0 4700 A      PULL      R3
656 04F1 4500 A      PULL      R1
657 04F2 81F0 A      LD        R0,DTMS
658 04F3 0200 A      RTS
659 04F4      ;
660 04F4      ;      READ DISK TEMPORARY (INTO INBUF)
661 04F4      ;

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662 04F4 2DAA A RDSKTM: JSR      @ASAVE
663 04F5 8DE6 A          LD      R3,ADSKTM
664 04F6 2102 A          JMP      RDSK
665 04F7          ;
666 04F7          ;      READ DISK INPUT (INTO INBUF)
667 04F7          ;
668 04F7 2DA7 A RDSKIN: JSR      @ASAVE
669 04F8 8DCC A          LD      R3,ADSKIN
670 04F9 8300 A RDSK:   LD      R0,0(R3)
671 04FA 3181 A          RCPY     R0,R1
672 04FB 61CE A          AND      R0,X4000
673 04FC 1506 A          BOC      NZ,$1
674 04FD          ;      INITIALIZE
675 04FD A52F A          ST      R1,DINS
676 04FE 6DCB A          OR       R1,X4000
677 04FF A700 A          ST      R1,0(R3)
678 0500 4C00 A          LI      R0,0
679 0501 A1C1 A          ST      R0,DINW
680 0502 A1D7 A          ST      R0,IBLKCT
681 0503          ;      READ FROM DINS, DINW
682 0503 8012 A $1:     LD      R0,INBUFB
683 0504 A1D4 A          ST      R0,BUFPTR
684 0505 79BD A          ISZ      DINW
685 0506          ;      LOOP
686 0506 290B A $3:     JSR      $GIOC
687 0507 B1D1 A          ST      R0,@BUFPTR
688 0508 79D0 A          ISZ      BUFPTR
689 0509 D1BF A          SUB      R0,X0D
690 050A 1106 A          BOC      Z,$3A          ; FINISHED
691 050B 81CD A          LD      R0,BUFPTR
692 050C E013 A          SKG      R0,INBUFE
693 050D 21F8 A          JMP      $3          ; NEXT
694 050E          ;      SKIP EXCESS CHARACTERS UNTIL CR
695 050E 2903 A          JSR      $GIOC
696 050F D1B9 A          SUB      R0,X0D
697 0510 15FD A          BOC      NZ,.-2
698 0511 258C A $3A:    JMP      @ARET
699 0512          ;
700 0512          ;      GET NEXT I/O CHAR (INTO R0) (FROM DINS,DINW)
701 0512          ;
702 0512 81C7 A $GIOC:  LD      R0,IBLKCT
703 0513 152C A          BOC      NZ,$G9
704 0514 81AE A          LD      R0,DINW
705 0515 3381 A          RCPY     R0,R3
706 0516 5CFF A          SHR      R0,1
707 0517 110D A          BOC      Z,$G1          ; READ DISK
708 0518 8700 A          LD      R1,0(R3)
709 0519 81C1 A          LD      R0,INHALF
710 051A 79C0 A          ISZ      INHALF
711 051B 1302 A          BOC      ODD,.-+3
712 051C 5DF8 A          SHR      R1,3
713 051D 2119 A          JMP      $G2
714 051E 79A4 A          ISZ      DINW
715 051F 81A3 A          LD      R0,DINW
716 0520 E1A6 A          SKG      R0,DINWMX
717 0521 2115 A          JMP      $G2
718 0522 4C00 A          LI      R0,0
719 0523 A19F A          ST      R0,DINW
720 0524 2112 A          JMP      $G2
721 0525          ;      READ SECTOR
722 0525 A1B5 A $G1:    ST      R0,INHALF
723 0526 8107 A          LD      R0,$G4
724 0527 C19B A          ADD      R0,DINW
725 0528 A19A A          ST      R0,DINW
726 0529 4CFA A          LI      R0,-6
727 052A A1AA A          ST      R0,$CNT
728 052B 2D1F A $G6:    JSR      @ADIO
729 052C 0002 A          .WORD    2          ; READ

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730 052D 0000 A DINS:  .WORD      0          ; LOGICAL SECTOR
731 052E 0600 A $G4:   .WORD      DINB        ; BUFFER
732 052F 0000 A $G5:   .WORD      0          ; STATUS
733 0530 0000 A        .WORD      0          ; PHYSICAL SECTOR
734 0531 3081 A        NOP                    ; ERROR
735 0532 81FC A        LD          RO,$G5
736 0533 299A A        JSR          $ERCK
737 0534 21F6 A        JMP          $G6
738 0535 79F7 A        ISZ          DINS
739 0536 21DB A        JMP          $GIOC
740 0537          ;      CHECK CHAR IN R1 FOR RETURN
741 0537 3481 A $G2:   RCPY          R1,R0
742 0538 6192 A        AND          RO,XFF
743 0539 11D8 A        BOC          Z,$GIOC
744 053A F18E A        SKNE          RO,X0D
745 053B 2108 A        JMP          $G10        ; CR
746 053C E18F A        SKG          RO,X7F
747 053D 0200 A        RTS                    ; NORMAL CHAR
748 053E          ;      N BLANKS
749 053E 618D A        AND          RO,X7F
750 053F A19A A        ST           RO,IBLKCT
751 0540          ;      BLANKS LEFT
752 0540 7D99 A $G9:   DSZ          IBLKCT
753 0541 3081 A        NOP
754 0542 4C20 A        LI           RO,020
755 0543 0200 A        RTS
756 0544          ;      CARRIAGE RETURN
757 0544          $G10:
758 0544 9505 A        LD          R1,@$ADW
759 0545 E581 A        SKG          R1,DINWMX
760 0546 0200 A        RTS
761 0547 4D00 A        LI           R1,0
762 0548 B501 A        ST           R1,@$ADW
763 0549 0200 A        RTS
764 054A 04C3 A $ADW:   .WORD      DINW
765 054B 054C A $ADIO: .WORD      DSCIO

766 054C          .PAGE 'DISC I/O'
767 054C          .LOCAL
768 054C          ;
769 054C          ;      CALLING SEQUENCE
770 054C          ;
771 054C          ;      JSR      DSCIO
772 054C          ;      (OPERATION CODE)
773 054C          ;      (LOGICAL SECTOR NUMBER)
774 054C          ;      (MEMORY BUFFER ADDRESS)
775 054C          ;      (STATUS RETURN)
776 054C          ;      (ACTUAL DISC ADDRESS REFERENCED)
777 054C          ;      (ERROR RETURN)
778 054C          ;      (NORMAL RETURN)
779 054C 0000 A R0      =          0
780 054C 0001 A R1      =          1
781 054C 0002 A R2      =          2
782 054C 0003 A R3      =          3
783 054C          ;
784 054C 000C A POA      =          12
785 054C 0005 A NPARMS   =          5
786 054C          ;
787 054C          ;      DISC PARAMETERS
788 054C 0000 A OPCODE   =          0
789 054C 0001 A SECNO    =          1
790 054C 0002 A MEMAD    =          2
791 054C 0003 A $STAT    =          3
792 054C 0004 A DSCAD     =          4
793 054C          ;
794 054C          ;      RETURN ADDRESSES
795 054C 0000 A ERROR    =          0
796 054C 0001 A NORMAL   =          1

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797 054C      ;
798 054C      ;      DISC OPERATION CODES
799 054C      ;
800 054C 0004 A SETADR =      4      ; SET MEMORY ADDRESS
801 054C 0002 A READ  =      2
802 054C 0007 A WRITE =      7
803 054C 0003 A RDCHK =      3
804 054C 0001 A RDSTAT =     1
805 054C 0005 A RESET =      5
806 054C      ;
807 054C      ;      DEVICE ADDRESS
808 054C      ;
809 054C 0018 A DISC  =     3*8
810 054C 4600 A DSCIO: PULL  R2      ; OBTAIN PARAMETERS LIST ADDRESS
811 054D 4A05 A      AISZ  R2,NPARMS
812 054E 4200 A      PUSH  R2
813 054F 4AFB A      AISZ  R2,-NPARMS
814 0550 8202 A      LD    R0,MEMADR(R2)
815 0551 4F04 A DS0:   LI    R3,SETADR
816 0552 0618 A      ROUT  DISC      ; PASS MEM BUFFER ADDR TO DISC
817 0553 1C03 A      BCC   POA,DS1
818 0554 2919 A      JSR   STATSUB   ; TEST DISC STATUS
819 0555 0200 A      RTS    ERROR
820 0556 21FA A      JMP    DS0
821 0557      ;
822 0557      ;      SCAN BAD SECTOR TABLE TO COMPUTE TRACK/SECTOR ADDRESS
823 0557      ;
824 0557 8201 A DS1:   LD    R0,SECNO(R2)
825 0558 9C21 A      LD    R3,@ABST
826 0559 CC21 A      ADD    R3,ABST
827 055A FC21 A DS2:   SKNE  R3,ABST
828 055B 2104 A      JMP    DS3
829 055C E300 A      SKG    R0,(R3)
830 055D 2102 A      JMP    DS3
831 055E 4BFF A      AISZ  R3,-1
832 055F 21FA A      JMP    DS2
833 0560 DC21 A DS3:   SUB    R3,ABST
834 0561 3C00 A      RADD   R3,R0
835 0562 3181 A      RCPY   R0,R1
836 0563 5D03 A      SHL    R1,3
837 0564 6116 A      AND    R0,H001F
838 0565 6516 A      AND    R1,H1F00
839 0566 3400 A      RADD   R1,R0
840 0567 A204 A      ST     R0,DSCADR(R2)
841 0568      ;
842 0568      ;      PERFCRM REQUESTED I/O OPERATION
843 0568      ;
844 0568 8E00 A DS4:   LD    R3,OPCODE(R2) ; GET OPERATION CODE
845 0569 0618 A      ROUT  DISC
846 056A 1C03 A      BOC    POA,STATSUB
847 056B 2902 A      JSR   STATSUB
848 056C 0200 A      RTS    ERROR
849 056D 21FA A      JMP    DS4
850 056E      ;
851 056E      ;      READ STATUS AND SAVE STATUS WORD
852 056E      ;
853 056E 4F01 A STATSUB:LI  R3,RDSTAT   ; READ DISC STATUS
854 056F 0418 A      RIN    DISC
855 0570 A203 A      ST     R0,$STAT(R2) ; SAVE
856 0571 710B A      SKAZ   R0,H00C0   ; TEST XMISSION ERROR OR DATA OVERRUN
857 0572 0200 A      RTS    ERROR
858 0573 710A A      SKAZ   R0,H0004   ; TEST DISC ON-LINE
859 0574 2103 A      JMP    ST1
860 0575 4F05 A      LI     R3,RESET   ; NOT ON-LINE - RESET DISC
861 0576 0618 A      ROUT  DISC
862 0577 0200 A      RTS    ERROR
863 0578 7106 A ST1:   SKAZ   R0,H0008   ; TEST BUSY BIT
864 0579 21F4 A      JMP    STATSUB    ; DISC STILL BUSY

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865 057A 0201 A      RTS      NORMAL
866 057B 001F A H001F: .WORD  X'1F
867 057C 1F00 A H1F00: .WORD  X'1F00
868 057D 00C0 A HC0C0: .WORD  X'C0
869 057E 0004 A H0004: .WORD  4
870 057F 0008 A H0008: .WORD  8
871 0580 0600 A DOBUF:  .=.+128
872 0600 0680 A DINB:   .=.+128      ; ALSO USED AS TEMP BUFFER
873 0680          .END

```

***** O ERRORS IN ASSEMBLY *****

```

$1      $1"      $100" $101" $11      $201" $202" $25      $3"      $3A"
03DF A 0503 A 044C A 0450 A 02CA A 0465 A 0461 A 02AB A 0506 A 0511 A

$4000" $50"      $51"      $52"      $53"      $54"      $55"      $60"      $70"      $71"
0456 A 047F A 0493 A 048B A 0483 A 0484 A 0498 A 049A A 04A9 A 04AC A

$80"      $81"      $ADIO" $ADW"      $ASCT  $BASC  $BBUF  $BIT0  $BUF2  $CMPR
0487 A 04BF A 054B A 054A A 038E A 040F A 0012 A 00C3 A 033E A 0400 A

$CNT"      $COUN  $CR"      $DELA  $DONE  $EA      $EASC  $EB      $EBUF  $EC
04D5 A 0265 A 049D A 02D1 A 0284 A 0009 A 040E A 0016 A 0013 A 0026 A

$ERCK" $FQUN  $G1"      $G10" $G2"      $G4"      $G5"      $G6"      $G9"      $GETC
04CE A 0406 A 0525 A 0544 A 0537 A 052E A 052F A 052B A 0540 A 03FE A

$GIOC" $GOES  $H700  $LOOP  $LP1      $LP2      $NRGT  $OVFL  $POOL  $PSIG
0512 A 0279 A 028D A 0257 A 0296 A 0287 A 000B A 0288 A 0271 A 0002 A

$QM      $REG      $S2      $S3      $SAV2  $SAV3  $SELF  $SHFT  $STAT# $STOB"
03AD A 02DB A 0263 A 0264 A 028B A 028C A 0002 A 027D A 0003 A 0457 A

$STR1" $STR2" $TA      $TB      $TC      $TTYA  $W1"      $W2"      $WRIT" $X
04AE A 04A1 A 0029 A 0012 A 0070 A 0038 A 04E5 A 04E1 A 04DD A 02CD A

ABST      ACO      AC1      AC2      AC3      ADINB  ADGBBF  ADSKIN  ADSKID  ADSKTM
0021 A 0000 A 0001 A 0002 A 0003 A 04C6 A 0464 A 04C5 A 04A0 A 04DC A

ARET      ARET1  ASAVE  ASAVE1 B1EQ1  BBUF2  BIT1      BLANK  BOTTOM  BUFPTR
049E A 03FA A 049F A 03F9 A 0004 A 03F6 A 0004 A 04CD A 033D A 04D9 A

CLOSED CLOSET CRADDR DINB      DINMX  DINS      DINW      DINWMX  CISC      DIVD
045D A 04DD A 0010 A 0600 A 04C1 A 052D A 04C3 A 04C7 A 0018 A 0266 A

DOBMX  DOBS      DOBUF  DOBW      DONE  DSO      DS1      DS2      DS3      DS4
04C8 A 0463 A 0580 A 04C4 A 029F A 0551 A 0557 A 055A A 0560 A 0568 A

DSCAD  DSCIO  DSKERR  DSKIN  DSKOBJ  DSKTMP  DTMS      DTMW      ECHOGC  ERROR
0004 A 054C A 0022 A 001F A 001E A 0020 A 04E3 A 04C2 A 02A3 A 0000 A

FIRS2  FIRST  FIRTS2  FLAG      FSTCD  GETC      H0004  H0008  H001F  H00C0
03D2 A 03E5 A 0429 A 02E5 A 03F7 A 02A6 A 057E A 057F A 057B A 057D A

H1F00  HCO      HEAD      HEX80  HSPAD  HSPRT  IBLKCT  INBUFB  INBUFE  INERR
057C A 03F8 A 0303 A 04D6 A 0048 A 0439 A 04DA A 0012 A 0013 A 03CF A

INHALF K4      LECO      LECOC  LGET      LGETC  LINIT  LLL      LNUM      LONLN
04DB A 04D7 A 02A4 A 042F A 02A7 A 0431 A 0410 A 0433 A 04D8 A 042A A

LPC      LPCC      MEMAD  MESS      MULT      NORMAL  NPARMS  NZ      NZRO      ODD
028F A 042D A 0002 A 02E6 A 0250 A 0C01 A 0C05 A 0005 A 0C05 A 0003 A

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IMPASP8K

OFFLN	ONLN	OPCCDE	P	PGECO	PGETC	PNTQM	POA	PPUTC	PRINT
03E9 A	03EE A	000C A	0002 A	02CF A	02D0 A	040D A	000C A	02A2 A	001A A
PUTC	R0	R1	R2	R3	RDCARD	RDCHK	RDCRD	RDCRDP	RDSK
028E A	0000 A	0001 A	0002 A	0003 A	03D4 A	0003 A	03FB A	03F5 A	04F9 A
RDSKIN	RDSKTM	RDSTAT	READ	RESET	RET	SAVE	SECNO	SETADR	SIZE4
04F7 A	04F4 A	0001 A	0002 A	0005 A	02DF A	02D6 A	0001 A	0004 A	FFFF A
SIZE8	ST1	STATSU	STATUS	STNDRD	TYPE	WAIT	WDSKOB	WDSKTM	WRITE
0001 A	0578 A	056E A	0001 A	0002 A	02F7 A	0428 A	0442 A	0472 A	0007 A
WTLOOP	X0D	X4000	X7F	X80	X8000	XFF	Z		
03D7 A	04C9 A	04CA A	04CC A	0302 A	02E4 A	04CB A	0001 A		

84BA B09D

IMPASMK

IMPASM8K

REVISION-G 01/02/74
IMPASM 0000370A 6/25/74

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1 0000 .TITLE IMPASM8K,'0000370A 6/25/74'
2 0000 ;
3 0000 ;*****
4 0000 ;
5 0000 ; SIZE8=-1 IF 4K VERSION
6 0000 ; SIZE8=1 IF 8K VERSION
7 0000 0001 A SIZE8 = 1
8 0000 FFFF A SIZE4 = -SIZE8
9 0000 .IF SIZE8
10 0000 1FFF A STTOP = 8191
11 0000 0001 A DBGVER = 1
12 0000 .BSECT
13 0000 000C A PNCHMD = 0C ; DEBUG ALSO USES THIS LOCATION
14 0000 000D B .=.+0D
15 0000 000E B MULT: .=.+1
16 0000 000F B DIVD: .=.+1
17 0000 0010 B GETC: .=.+1
18 0010 0011 B PUTC: .=.+1
19 0011 0012 B RDCRD: .=.+1
20 0012 06A0 A INBUF: .WORD INBUF
21 0013 06EF A INBUFE: .WORD INBUF+79
22 0014 0015 B ECHOGC: .=.+1
23 0015 0016 B LINIT: .=.+1
24 0016 0017 B WDSKTM: .=.+1
25 0017 0018 B WDSKOB: .=.+1
26 0018 0019 B RDSKIN: .=.+1
27 0019 001A B RDSKTM: .=.+1
28 001A 001B B HSPRT: .=.+1
29 001B 001C B MESS: .=.+1
30 001C 001D B CLOSET: .=.+1
31 001D 001E B CLOSEO: .=.+1
32 001E FFFE A DSKOBJ: .WORD -2
33 001F FFFE A DSKIN: .WORD -2
34 0020 FFFE A DSKTMP: .WORD -2
35 0021 1699 A ABST: .WORD BADSTB ; BAD SECTOR TABLE
36 0022 1343 A .WORD DSKERR
37 0023 ;*****
38 0023 ;
39 0023 ;
40 0023 ;
41 0023 ; BOC ASSIGNMENTS
42 0023 0001 A Z=1
43 0023 0002 A P=2
44 0023 0003 A ODD=3
45 0023 0004 A BLEQ1=4
46 0023 0005 A NZ=5
47 0023 000B A LEZ=11
48 0023 ;
49 0023 0000 A R0=0
50 0023 0001 A R1=1
51 0023 0002 A R2=2
52 0023 0003 A R3=3
53 0023 8000 A S=08000
54 0023 0008 A ELIM=8 ;NUMBER OF ERRORS LIMIT FOR EACH STATEMENT

55 0023 .PAGE 'CONSTANTS'
56 0023 0000 A ZERO: .WORD 0
57 0024 00FF A K255: .WORD 255

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58 0025 000B A K11: .WORD 11
59 0026 0001 A K1: .WORD 1
60 0027 0003 A K3: .WORD 3
61 0028 0006 A K6: .WORD 6
62 0029 0008 A K8: .WORD 8
63 002A 0007 A K7: .WORD 7
64 002B 0009 A K9: .WORD 9
65 002C 0004 A K4: .WORD 4
66 002D 000F A K15: .WORD 15
67 002E FFF0 A XFFF0: .WORD 0FFF0
68 002F FFF7 A XFFF7: .WORD 0FFF7
69 0030 8000 A X8000: .WORD 08000
70 0031 6666 A X6666: .WORD 06666
71 0032 0040 A HEX40: .WORD 040
72 0033 005A A HEX5A: .WORD 05A
73 0034 0020 A HEX20: .WORD 020
74 0035 002F A HEX2F: .WORD 02F
75 0036 0039 A HEX39: .WORD 039
76 0037 0046 A HEX46: .WORD 046
77 0038 0030 A HEX30: .WORD 030
78 0039 0037 A HEX37: .WORD 037
79 003A 007F A HEX7F: .WORD 07F
80 003B 003F A HEX3F: .WORD 03F
81 003C 002A A HEX2A: .WORD 02A
82 003D 0400 A HEX400: .WORD 0400
83 003E 1000 A X1000: .WORD 01000
84 003F 0100 A K256: .WORD 256
85 0040 0002 A K2: .WORD 2
86 0041 0010 A K16: .WORD 16
87 0042 FF00 A XFF00: .WORD 0FF00
88 0043 0029 A RPAREN: .WORD ')' /256
89 0044 0058 A CHARX: .WORD 'X' /256
90 0045 0027 A QUOTE: .WORD '"' /256
91 0046 0028 A LPAREN: .WORD '(' /256
92 0047 000D A CR: .WORD 0D
93 0048 2020 A BLANKS: .WORD ' '
94 0049 003B A SEMI: .WORD ';' /256
95 004A 002E A DOT: .WORD '.' /256
96 004B 003A A COLAN: .WORD ':' /256
97 004C 003D A EQUAL: .WORD '=' /256
98 004D 5C00 A SHLIN: SHL R0,0
99 004E 0024 A DOLLAR: .WORD '$' /256
100 004F 002C A COMMA: .WORD ',' /256
101 0050 002B A CPLUS: .WORD '+' /256
102 0051 002D A CMINUS: .WORD '-' /256
103 0052 0025 A CNOT: .WORD '%' /256
104 0053 0026 A CAND: .WORD '&' /256
105 0054 0021 A COR: .WORD '!' /256
106 0055 13E8 A ERBAS: .WORD ERBUF
107 0056 ;
108 0056 0034 B BLANK = HEX20 ; ' ' /256
109 0056 0038 B CZERO = HEX30 ; '0' /256
110 0056 0032 B CAT = HEX40 ; '@' /256
111 0056 003C B CMPY = HEX2A ; '*' /256
112 0056 0035 B CDIV = HEX2F ; '/' /256

113 0056 .PAGE 'VARIABLES'
114 0056 ; ACTR,BCTR,TCTR, MUST BE IN THAT SEQUENCE
115 0056 0000 A ACTR: .WORD 0 ;ASECT LOC CTR
116 0057 0000 A BCTR: .WORD 0 ;BSECT LOC CTR
117 0058 0000 A TCTR: .WORD 0 ;TSECT LOC CTR
118 0059 005A B AMAX: .=.+1

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119 005A 005B B BMAX:      .=.+1
120 005B 005C B TMAX:      .=.+1
121 005C 0000 A LOCCTR:    .WORD      0      ;CURRENT LOC CTR
122 005D 0000 A PASS:      .WORD      0      ;PASS1 =0 , PASS2 =NON ZERO
123 005E 06A0 A INPTR:     .WORD      INBUF   ;POINTS TO NEXT INPUT CHAR.
124 005F 0060 B LCPTR:     .=.+1      ;LAST ACTIVE CHAR PTR (USED BY ERROR)
125 0060 0000 A BASE:      .WORD      0
126 0061 0000 A TOP:       .WORD      0
127 0062 0000 A NEXT:      .WORD      0
128 0063 16C1 A BASEA:     .WORD      STBAS
129 0064 1FFF A TOPA:      .WORD      STTOP
130 0065 1FFF A NEXTA:     .WORD      STTOP
131 0066 16C1 A BASEB:     .WORD      STBAS
132 0067 1FFF A TOPB:      .WORD      STTOP
133 0068 1FFF A NEXTB:     .WORD      STTOP
134 0069 006A B XINOK:     .=.+1      ;EXTENDED INSTRUCTIONS OK? 0=NO
135 006A 006B B MOFLAG:    .=.+1      ;MULTIPLE OUTPUT FLAG 0=1ST 1=SUBSEQ.
136 006B 0003 A SECT:      .WORD      3      ;SECTION 1=ASECT 2=BSECT 3=TSECT
137 006C 0000 A LOCREG:    .WORD      0      ;LOCAL REGION NUMBER (0 TO 255)
138 006D 070E A IFPTR:     .WORD      IFTAB-1
139 006E 070E A IFPTRA:    .WORD      IFTAB-1 ;INITIALIZATION FOR IFPTR
140 006F 0000 A IFSTAT:    .WORD      0      ;IFSTATUS 0=ENDIF LAST 2=IF LAST 4=ELSE LAST
141 0070 0001 A IFMODE:    .WORD      1      ;0=SKIP 1=NO SKIP
142 0071 003C A PGRL:      .WORD      60     ;NUM OF LINES REMAINING ON PAGE
143 0072 0000 A IVAL:      .WORD      0      ;INSTR. VALUE FROM DI TABLE
144 0073 0000 A ICLASS:    .WORD      0      ;INSTR CLASS DI TABLE
145 0074 0000 A FORMPT:    .WORD      0      ;SYMBOL TABLE FORM PTR
146 0075 0076 B FORMB:     .=.+1      ;FORM BEGIN FIELD BITS
147 0076 0077 B FORMT:     .=.+1      ;FORM TERMINAL FIELD BITS
148 0077 0078 B FORMM:     .=.+1      ;FORM FIELD MASK
149 0078 0079 B FORMBN:    .=.+1      ;FORM BEGINNING BIT NUMBER
150 0079 007A B FORMTN:    .=.+1      ;FORM TERMINAL BIT NUM.
151 007A 0000 A EXPVAL:    .WORD      0      ;VALUE FROM EXP.ROUTINES
152 007B 007C B EXPPD:     .=.+1      ;EXP PREVIOUS DEF FLAG
153 007C 007D B EXPREL:    .=.+1      ;EXP RELOCATION CODE
154 007D 0000 A NAM0:      .WORD      0
155 007E 0000 A NAM1:      .WORD      0
156 007F 0000 A NAM2:      .WORD      0
157 0080 0000 A CNAM0:     .WORD      0
158 0081 0000 A CNAM1:     .WORD      0
159 0082 0083 B STVAL:     .=.+1      ;SYMBOL TALBE VALUE
160 0083 0084 B STPDEF:    .=.+1      ;SYMBOL TABLE PREV. DEFINITION FLAG
161 0084 0085 B STREL:     .=.+1      ;SYMBOL TABLE RELOCATION FLAG
162 0085 0086 B STPT:      .=.+1      ;SYMBOL TABLE PRT.
163 0086 0087 B ITVAL:     .=.+1      ;ITEM VALUE
164 0087 0088 B ITREL:     .=.+1      ;ITEM RELOCATION
165 0088 0089 B EC:        .=.+1      ;ERROR COUNT
166 0089 0001 A INDEV:     .WORD      1      ;INPUT DEVICE 0=CR 1=KB 2=PT
167 008A 008B B LBLPT:     .=.+1      ;LABEL PRT, USED BY ASSIGN DIRECTIVE
168 008B 008C B ERRPT:     .=.+1      ;POINTS TO NEXT ERROR ENTRY
169 008C 008D B LCNT1:     .=.+1      ;DEC LINE CNT FOR PRINTING1 (0/256)
170 008D 008E B LCNT2:     .=.+1      ;DEC LINE CNT FOR PRINTING2 (06666=0)
171 008E 008F B LISTMD:    .=.+1      ;VALUE FROM LAST LIST DIRECTIVE
172 008F 0001 A ERRST:     .WORD      1      ;ERROR LISTING REQUESTED 1=NO 0=YES
173 0090 0091 B OBJMOD:    .=.+1      ;0=NO OBJECT MODULE NZ=OBJ MOD
174 0091 0001 A NOLIST:    .WORD      1      ;0=NO LISTING
175 0092 0093 B NOCOM:     .=.+1      ;';'=NO COMMENT PRINTING
176 0093 0094 B NOMAP:     .=.+1      ; NO MAP FLAG 0=NONE
177 0094 FFFE A IDSKIN:     .WORD      -2     ; -2=NO, OTHER=INITIAL LOGICAL SECTION
178 0095 FFFE A IDSKTM:     .WORD      -2     ; -2=NO, OTHER=INITIAL LOGICAL SECTION
179 0096 0000 A HSPR:      .WORD      0      ; 1=NO, 0=HIGH SPEED PRINTER
180 0097 0000 A TYPMOD:    .WORD      0      ; 0=PRINT, NZ=TYPE OR PUNCH
181 0098 .IF      DBGVER

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182 0098 0000 A ERDEB: .WORD 0 ;1=ERROR DEBUG MODE
183 0099 0000 A MAPDEB: .WORD 0 ;1=MAP DEBUG MODE
184 009A .ENDIF

185 009A .PAGE 'INITIALIZATION AND START'
186 009A .LOCAL
187 009A ;*****
188 009A .ASECT
189 0000 06A0 A .=06A0
190 06A0 06F0 A INBUF: .=+80
191 06F0 070E A PGSTRG: .=+30 ;PAGE STRING BUFFER
192 070E 070F A .=+1
193 070F 0719 A IFTAB: .=+10 ;IF TABLE
194 0719 072B A TTLBUF: .=+18
195 072B 0000 A .WORD 0
196 072C .ENDIF
197 072C ;*****
198 072C ;
199 072C START:
200 072C ; IMP 16/L TEST
201 072C 8D3B A LD R3,HEX760
202 072D 0418 A RIN 018
203 072E 4801 A AISZ R0,1
204 072F 2C15 B JSR @LINIT
205 0730 .IF SIZE8
206 0730 ; MOVE BAD SECTOR TABLE
207 0730 4CD8 A LI R0,-40
208 0731 8937 A LD R2,LABST
209 0732 8C21 B LD R3,ABST
210 0733 8600 A NEW1: LD R1,0(R2)
211 0734 A700 A ST R1,0(R3)
212 0735 4A01 A AISZ R2,1
213 0736 4B01 A AISZ R3,1
214 0737 4801 A AISZ R0,1
215 0738 21FA A JMP NEW1
216 0739 .ENDIF
217 0739 ;
218 0739 4C01 A LI R0,1
219 073A A089 B ST R0,INDEV
220 073B A096 B ST R0,HSPR
221 073C A097 B ST R0,TYPMOD
222 073D 4C00 A LI R0,0
223 073E A00C A ST R0,PNCHMD
224 073F A05D B ST R0,PASS
225 0740 9C9A I LD R3,MSGBEG
226 0741 2C9B I JSR ONLMSG
227 0742 ; READ MEMORY SIZE
228 0742 2C9C I JSR RDTTY
229 0743 21E8 A JMP START
230 0744 290E A JSR GSIZE
231 0745 210A A JMP $2 ;USE DEFAULT SIZE
232 0746 1101 A BOC Z,+.2
233 0747 A063 B ST R0,BASEA
234 0748 A464 B ST R1,TOPA
235 0749 A467 B ST R1,TOPB
236 074A 2C9D I JSR GCOMMA
237 074B 2104 A JMP $2
238 074C 2906 A JSR GSIZE ;GET ALTERNATE REGION SIZE
239 074D 2102 A JMP $2
240 074E A066 B ST R0,BASEB
241 074F A467 B ST R1,TOPB
242 0750 $2:

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IMPASM8K

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243 0750 2C9E I      JSR      GNVC
244 0751 2118 A      JMP      NEWASM
245 0752 21D9 A      JMP      START ;ERROR-EXTRA DATA
246 0753 ;          END OF MEMORY SIZE INPUT
247 0753 ;
248 0753 ;          GET SIZE PAIR
249 0753 ;
250 0753 ;          GSIZE:
251 0753 290E A      JSR      $GDEC
252 0754 0200 A      RTS
253 0755 A511 A      ST       R1,$TMP
254 0756 2C9E I      JSR      GNVC
255 0757 2108 A      JMP      $3
256 0758 F04B B      SKNE     R0,COLAN
257 0759 2101 A      JMP      .+2
258 075A 2105 A      JMP      $3 ;FORCE ERROR
259 075B 2906 A      JSR      $GDEC
260 075C 2103 A      JMP      $3 ;FORCE ERROR
261 075D 8109 A      LD       R0,$TMP
262 075E D426 B      SUB      R1,K1
263 075F 0201 A      RTS      1
264 0760 7C5E B $3:   DSZ      INPTR ;INPUT CHAR PTR ;FORCE ERROR
265 0761 0200 A      RTS      0
266 0762 ;
267 0762 ;          GET DECIMAL VAL FOR SIZE
268 0762 ;
269 0762 2C9F I $GDEC: JSR      GITEM
270 0763 0200 A      RTS
271 0764 8486 B      LD       R1,ITVAL
272 0765 5D0A A      SHL      R1,10 ;VAL*1024
273 0766 0201 A      RTS      1
274 0767 0768 A $TMP: .+.+1
275 0768 0760 A HEX760: .WORD 0760
276 0769 1E63 A LABST: .WORD 01E63

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```

277 076A ;          .PAGE 'NEW ASSEMBLY'
278 076A ;          .LOCAL
279 076A ;
280 076A ;          BEGIN NEW ASSEMBLY
281 076A ;
282 076A 4C00 A NEWASM: LI      R0,0
283 076B A00C A      ST       R0,PNCHMD
284 076C A05D B      ST       R0,PASS ; 0=PASS 1
285 076D A069 B      ST       R0,XINOK ; 0= EXTENDED INSTR ILLEGAL
286 076E A090 B      ST       R0,OBJMOD
287 076F ;          .IF      DBGVER
288 076F A098 B      ST       R0,ERDEB ;RESET ERROR DEBUG MODE
289 0770 A099 B      ST       R0,MAPDEB ;RESET MAP DEBUG MODE
290 0771 ;          .ENDIF
291 0771 A05A B      ST       R0,BMAX
292 0772 A05B B      ST       R0,TMAX
293 0773 B0A0 I      ST       R0,PTRTAB ;EMPTY POINTER TABLE
294 0774 B0A1 I      ST       R0,PTREND-1
295 0775 A1AA A      ST       R0,TTLBUF+7
296 0776 8064 B      LD       R0,TOPA
297 0777 A065 B      ST       R0,NEXTA
298 0778 8067 B      LD       R0,TOPB
299 0779 A068 B      ST       R0,NEXTB
300 077A 4C01 A      LI       R0,1
301 077B A093 B      ST       R0,NOMAP
302 077C A097 B      ST       R0,TYPMOD
303 077D A089 B      ST       R0,INDEV ;INPUT DEVICE 0=CR,1=KB,2=PT ;SET INPU

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304 077E A091 B      ST      R0,NOLIST      ;SET LISTING MODE
305 077F A08E B      ST      R0,LISTMD
306 0780 A08F B      ST      R0,ERRLST
307 0781 A096 B      ST      R0,HSPR
308 0782 4CFE A      LI      R0,-2
309 0783 A094 B      ST      R0,IDSKIN
310 0784 A095 B      ST      R0,IDSKTM
311 0785 A01E B      ST      R0,DSKOBJ
312 0786 4C05 A      LI      R0,5
313 0787 A191 A      ST      R0,TTLBUF
314 0788 8138 A      LD      R0,$MAIN
315 0789 A193 A      ST      R0,TTLBUF+4
316 078A 8137 A      LD      R0,$MAIN+1
317 078B A192 A      ST      R0,TTLBUF+5
318 078C 8136 A      LD      R0,$MAIN+2
319 078D A191 A      ST      R0,TTLBUF+6
320 078E A092 B      ST      R0,NOCOM
321 078F 4FF5 A      LI      R3,-11
322 0790 8048 B      LD      R0,BLANKS
323 0791 890F A      LD      R2,$TTL
324 0792 A200 A      ST      R0,0(R2)
325 0793 4A01 A      AISZ    R2,1
326 0794 4B01 A      AISZ    R3,1
327 0795 21FC A      JMP      .-3
328 0796 4F06 A      LI      R3,6
329 0797 2CA2 I      JSR      MANYNL
330 0798 9CA3 I      LD      R3,MSGNXT
331 0799 2C9B I      JSR      ONLMSG      ;'NEXT ASSEMBLY *.ASM'
332 079A      ;
333 079A      ;      INPUT CONTROL STATEMENT
334 079A 2C9C I      JSR      RDTTY
335 079B 21CE A      JMP      NEWASM
336 079C 2CA4 I      JSR      PRCTRL      ;PROCESS CONTROL STATEMENT
337 079D 21CC A      JMP      NEWASM
338 079E 2903 A      JSR      PINIT
339 079F 2CA5 I      JSR      NEWLIN
340 07A0 2132 A      JMP      NEXTST
341 07A1 0720 A $TTL: .WORD    TTLBUF+7
342 07A2      ;
343 07A2      ;      PASS INITIALIZATION
344 07A2      ;
345 07A2 4D03 A PINIT: LI      R1,3
346 07A3 A46B B      ST      R1,SECT      ;SECT:=TSECT
347 07A4 4D01 A      LI      R1,1
348 07A5 A48E B      ST      R1,LISTMD
349 07A6 A470 B      ST      R1,IFMODE
350 07A7 4C00 A      LI      R0,0
351 07A8 A00C A      ST      R0,PNCHMD
352 07A9 B0A6 I      ST      R0,PGSTRG      ;RESET PAGE STRING
353 07AA A06F B      ST      R0,IFSTAT
354 07AB A06C B      ST      R0,LOCREG      ;LOCAL REGION NUMBER
355 07AC A056 B      ST      R0,ACTR
356 07AD A057 B      ST      R0,BCTR
357 07AE A058 B      ST      R0,TCTR
358 07AF A05C B      ST      R0,LOCCTR
359 07B0 B0A7 I      ST      R0,SOUCK      ;SOURCE CHECKSUM
360 07B1 B0A8 I      ST      R0,OBJCK      ;OBJECT CHECKSUM
361 07B2 846E B      LD      R1,IFPTRA
362 07B3 A46D B      ST      R1,IFPTR
363 07B4 8431 B      LD      R1,X6666
364 07B5 A488 B      ST      R1,EC
365 07B6 A48D B      ST      R1,LCNT2
366 07B7 4D30 A      LI      R1,'0'/256

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IMPASM8K

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367 07B8 A48C B      ST      R1,LCNT1
368 07B9 4D37 A      LI      R1,55
369 07BA A471 B      ST      R1,PGRL
370 07BB 8094 B      LD      R0,IDSKIN
371 07BC A01F B      ST      R0,DSKIN
372 07BD 8095 B      LD      R0,IDSKTM
373 07BE A020 B      ST      R0,DSKTMP
374 07BF 2CA9 I      JSR      INITOR          ;INITIALIZE OBJECT RECORD
375 07C0 0200 A      RTS
376 07C1 4D41 A $MAIN: .ASCII 'MAINPR'
    07C2 494E A
    07C3 5052 A

377 07C4              .PAGE  'STATEMENT PROCESS AND FORM USAGE'
378 07C4              .LOCAL
379 07C4              ;
380 07C4              ;      STATEMENT PROCESS
381 07C4              ;
382 07C4              ;
383 07C4 1101 A $XARG: .WORD  XARGCK
384 07C5 2042 A SCB:  .WORD  ' B '
385 07C6 4C18 A XERRR: LI      R0,24;          SYNTAX ERROR          ;SYNTAX ERROR
386 07C7              ;
387 07C7 2CAA I XERR1: JSR      ERROR
388 07C8              ;
389 07C8 2105 A      JMP      DIREND
390 07C9 2CAA I ERRST: JSR      ERROR
391 07CA 4C00 A      LI      R0,0
392 07CB 4D01 A INABS: LI      R1,1          ;ABS
393 07CC 2CAB I INOUT: JSR      OUTWRD
394 07CD 2103 A      JMP      ENDST
395 07CE              ;
396 07CE 2DF5 A DIREND: JSR      @$XARG
397 07CF 2CAC I      JSR      OIBREP          ;OUTPUT INPUT BUFFER AND REPORT ERRORS
398 07D0 2102 A      JMP      NEXTST
399 07D1 2DF2 A ENDST: JSR      @$XARG
400 07D2 2CAD I      JSR      REPERR          ;REPORT ERRORS
401 07D3      NEXTST:
402 07D3 8096 B      LD      R0,HSPR
403 07D4 A097 B      ST      R0,TYPMOD
404 07D5 8055 B      LD      R0,ERRBAS
405 07D6 A08B B      ST      R0,ERRPT
406 07D7 4C00 A      LI      R0,0
407 07D8 A06A B      ST      R0,MOFLAG
408 07D9 4DF1 A      LI      R1,-15
409 07DA 4400 A      PULL    R0
410 07DB 4901 A      AISZ    R1,1
411 07DC 21FD A      JMP      .-2
412 07DD 81E7 A      LD      R0,$CB
413 07DE B0AE I      ST      R0,RELTB+3      ;REPLACE B IN ENTRY WHICH MAY HAVE I
414 07DF              ;
415 07DF              ;
416 07DF 2CAF I      JSR      READ
417 07E0 2C9E I NEXTLB: JSR      GNVC          ;GET NEXT VALID CHAR
418 07E1 21EC A      JMP      DIREND          ;FINISH STATEMENT (END OF STAT)
419 07E2 F04A B      SKNE    R0,DOT
420 07E3 2108 A      JMP      $DOT          ;      DIRECTIVE OR .=
421 07E4              ;      LABEL, INSTR OR FORM
422 07E4 2C80 I      JSR      BLDNAM          ;BUILD NAME
423 07E5 21E0 A      JMP      XERROR          ;NO NAME
424 07E6 F04B B      SKNE    R0,COLAN
425 07E7 24B1 I      JMP      LABEL          ;      LABEL

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426 07E8 F04C B      SKNE    R0,EQUAL
427 07E9 24B2 I      JMP     ASSIGN      ;ASSIGN DIRECTIVE
428 07EA 2CB3 I      JSR     IFBYP      ;IF BYPASS?
429 07EB 2108 A      JMP     $$SERCH    ;INSTR OR FORM SEARCH
430 07EC 2C9E I $DOT: JSR     GNVC
431 07ED 21D8 A      JMP     XERROR
432 07EE F04C B      SKNE    R0,EQUAL
433 07EF 24B4 I      JMP     DOTASN
434 07F0 7C5E B      DSZ     INPTR      ;INPUT CHAR PTR
435 07F1 4C2E A      LI      R0,'.'/256
436 07F2 2CB5 I      JSR     BLDDIR
437 07F3 21D2 A      JMP     XERROR
438 07F4          ;      DIRECTIVE OR INSTR OR FORM SEARCH
439 07F4 2CB6 I $SERCH: JSR     DISER
440 07F5 2107 A      JMP     $5A
441 07F6          ;      MATCH FOUND
442 07F6 8300 A      LD      R0,0(R3)
443 07F7 8701 A      LD      R1,1(R3)
444 07F8 A072 B      ST      R0,IVAL
445 07F9 A473 B      ST      R1,ICLASS
446 07FA 8069 B      LD      R0,XINOK    ;EXTENDED INST OK FLAG (0=NO)
447 07FB 3681 A      RCPY    R1,R2
448 07FC 2200 A      JMP     0(R2)
449 07FD          $5A:
450 07FD          ;      TABLE EXHAUSTED, SEARCH FORM IN SYMBOL TABLE
451 07FD 4C02 A      LI      R0,2
452 07FE C080 B      ADD     R0,CNAM0    ;1ST 2 COMPRESSED CHARS. OF NAME
453 07FF A080 B      ST      R0,CNAM0    ;1ST 2 COMPRESSED CHARS. OF NAME
454 0800 2CB7 I      JSR     STSER      ;SEARCH SYMBOL TABLE
455 0801 215E A      JMP     $7A        ;TABLE OVERFLOW
456 0802          ;
457 0802          ;      PROCESS FORM REFERENCE
458 0802          ;
459 0802 83FE A      LD      R0,-2(R3)
460 0803 A160 A      ST      R0,$FVAL    ;FORM VALUE
461 0804 8300 A      LD      R0,0(R3)
462 0805 682C B      OR      R0,K4
463 0806 A300 A      ST      R0,0(R3)    ;SET USED BIT
464 0807 8083 B      LD      R0,STPDEF
465 0808 1155 A      BOC     Z,$7      ;ERROR NOT PREV. DEFINED
466 0809 93FF A      LD      R0,-1(R3)
467 080A 6027 B      AND     R0,K3
468 080B A159 A      ST      R0,$FREL
469 080C 8874 B      LD      R2,FORMPT
470 080D 8200 A      LD      R0,0(R2)
471 080E A076 B      ST      R0,FORMT    ;FORM FIELD TERMINAL BITS
472 080F 8201 A      LD      R0,1(R2)
473 0810 A075 B      ST      R0,FORMB    ;FORM FIELD BEGIN BITS
474 0811 4C10 A      LI      R0,16    ;INITIALIZE
475 0812 A078 B      ST      R0,FORMBN    ;FORM FIELD BEGINNING BIT NUMBER
476 0813 A079 B      ST      R0,FORMTN    ;FORM FIELD TERMINAL BIT NUMBER
477 0814 8075 B      LD      R0,FORMB    ;FORM FIELD BEGIN BITS
478 0815 2935 A      JSR     $FBIT
479 0816 2140 A      JMP     $13      ;FORM END
480 0817 A075 B      ST      R0,FORMB    ;FORM FIELD BEGIN BITS
481 0818 2118 A      JMP     $11B      ;GO TO BOTTOM OF FORM LOOP
482 0819          ;      TOP OF FORM LOOP
483 0819 2CB8 I $12: JSR     EXPABS
484 081A 213A A      JMP     $8        ;NONE
485 081B 6077 B      AND     R0,FORMM    ;FORM FIELD MASK RIGHT JUSTIFIED ;MASK
486 081C 844D B      LD      R1,SHLIN
487 081D C479 B      ADD     R1,FORMTN    ;FORM FIELD TERMINAL BIT NUMBER ;TERMIN
488 081E A500 A      ST      R1,$9

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499 081F 0000 A $9:  HALT          ; *** A SHL INST. WILL BE STORED HERE ***
490 0820 C143 A      ADD      R0,$FVAL      ;FORM VALUE
491 0821 A142 A      ST       R0,$FVAL      ;FORM VALUE
492 0822           ;      NOW CHECK FOR EXP. SIZE ERROR
493 0822 807A B      LD       R0,EXPVAL     ;EXPRESSION VALUE ;VALUE FROM EXP.
494 0823 8477 B      LD       R1,FORMM     ;FORM FIELD MASK RIGHT JUSTIFIED ;MASK
495 0824 5100 A      CAI      R1,0
496 0825 3483 A      RAND     R1,R0
497 0826 1102 A      BOC      Z,$11
498 0827 3482 A      RXOR     R1,R0
499 0828 1532 A      BOC      NZ,$10        ;ERROR - FIELD OVERFLOW
500 0829           ;      BOTTOM OF FORM LOOP
501 0829 8075 B $11:  LD       R0,FORMB     ;FORM FIELD BEGIN BITS
502 082A 2920 A      JSR      $FBIT
503 082B 212B A      JMP      $13          ;FORM END
504 082C A075 B      ST       R0,FORMB     ;FORM FIELD BEGIN BITS
505 082D A534 A      ST       R1,$TMP
506 082E 2C9D I      JSR      GCOMMA
507 082F 2125 A      JMP      $8
508 0830 8531 A      LD       R1,$TMP
509 0831           $11B:
510 0831 D441 B      SUB      R1,K16
511 0832 C478 B      ADD      R1,FORMBN     ;FORM FIELD BEGINNING BIT NUMBER ;PREV
512 0833 A478 B      ST       R1,FORMBN     ;FORM FIELD BEGINNING BIT NUMBER
513 0834           ;
514 0834 8076 B      LD       R0,FORMT     ;FORM FIELD TERMINAL BITS
515 0835 2915 A      JSR      $FBIT
516 0836 2124 A      JMP      $10
517 0837 A076 B      ST       R0,FORMT     ;FORM FIELD TERMINAL BITS
518 0838 D441 B      SUB      R1,K16
519 0839 C479 B      ADD      R1,FORMTN     ;FORM FIELD TERMINAL BIT NUMBER ;PREV B
520 083A A479 B      ST       R1,FORMTN     ;FORM FIELD TERMINAL BIT NUMBER
521 083B           ;
522 083B           ;      GENERATE MASK
523 083B           ;
524 083B 8478 B      LD       R1,FORMBN     ;FORM FIELD BEGINNING BIT NUMBER
525 083C D479 B      SUB      R1,FORMTN     ;FORM FIELD TERMINAL BIT NUMBER
526 083D F525 A      SKNE     R1,HEXF
527 083E 2108 A      JMP      $F16        ;SPECIAL CASE 16 BIT FORM
528 083F C426 B      ADD      R1,K1
529 0840 C44D B      ADD      R1,SHLIN     ;SHL R0,0 INSTR.
530 0841 A501 A      ST       R1,$11A     ; *** CAREFUL ***
531 0842 4C01 A      LI       R0,1
532 0843 5C00 A $11A: SHL      R0,0        ; *****
533 0844 D026 B      SUB      R0,K1
534 0845 A077 B      ST       R0,FORMM     ;FORM FIELD MASK RIGHT JUSTIFIED ;FORM
535 0846 21D2 A      JMP      $12
536 0847           ;
537 0847           ;      SPECIAL CASE 16 BIT FORM TO ALLOW RELOCATABLE ADR
538 0847 2CB9 I $F16: JSR      EXP
539 0848 210C A      JMP      $8
540 0849 2CAB I      JSR      OUTWRD
541 084A 2186 A      JMP      ENDST
542 084B           ;
543 084B           ;      FIND BIT NUM IN WORD(R0), RESULT IN R1, SHIFT R0 ACCORDINGLY
544 084B           ;
545 084B 4D0F A $FBIT: LI       R1,15
546 084C 1501 A      BOC      NZ,$FB1
547 084D 0200 A      RTS
548 084E 1202 A $FB1: BOC      P,$FB2
549 084F 5C01 A      SHL      R0,1
550 0850 0201 A      RTS      1
551 0851 5C01 A $FB2: SHL      R0,1

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552 0852 49FF A      AISZ      R1,-1
553 0853 3081 A      NOP
554 0854 21F9 A      JMP        $FB1
555 0855          ;      MISSING ARG ERROR
556 0855 4C00 A $8:   LI         R0,0;      MISSING ARG. ERROR
557 0856 2CAA I      JSR        ERROR
558 0857          ;      FORM PROCESS END
559 0857 810C A $13:  LD         R0,$FVAL    ;FORM VALUE
560 0858 850C A      LD         R1,$FREL
561 0859 2CAB I      JSR        OUTWRD
562 085A 24BA I      JMP        ENDST
563 085B          ;      ERROR - FIELD OVERFLOW
564 085B 4C06 A $10:  LI         R0,6;      VALUE ERROR
565 085C 2CAA I      JSR        ERROR
566 085D 21F9 A      JMP        $13
567 085E          ;
568 085E          ;      ERROR ILLEGAL INSTR
569 085E 4C2A A $7:   LI         R0,42;      UNDEFINED INSTRUCTION
570 085F 24BB I      JMP        ERRST
571 0860          ;      ERROR SYMBOL TABLE OVERFLOW
572 0860 4C24 A $7A:  LI         R0,36;      TABLE OVERFLOW ERROR
573 0861 24BB I      JMP        ERRST
574 0862 0863 A $TMP: .=.+1
575 0863 000F A HEXF: .WORD      0F
576 0864 0865 A $FVAL: .=.+1      ;FORM VALUE
577 0865 0866 A $FREL: .=.+1
578 0866          .ENDIF

579 0866          .PAGE      'END DIRECTIVE'
580 0866          .LOCAL
581 0866 2031 A $X2031: .WORD      02031
582 0867          ;
583 0867          ;      END DIRECTIVE
584 0867          ;
585 0867          .END:
586 0867 2CBC I      JSR        OOREC      ;OUTPUT OBJECT RECORD IF ANY
587 0868 2CB9 I      JSR        EXP
588 0869 3081 A      NOP
589 086A 3081 A      RCPY      R2,R0
590 086B 1502 A      BOC       NZ,+.3
591 086C 4C2A A      LI         R0,42;      UNDEFINED ERROR
592 086D 2CAA I      JSR        ERROR
593 086E 8C6B B      LD         R3,SECT
594 086F 805C B      LD         R0,LOCCTR
595 0870 A355 B      ST         R0,ACTR-1(R3)
596 0871 8758 B      LD         R1,AMAX-1(R3)
597 0872 2CBD I      JSR        MAXR1      ;SET R1 = MAX OF R1 AND R0
598 0873 A758 B      ST         R1,AMAX-1(R3)
599 0874 806D B      LD         R0,IFPTR
600 0875 F06E B      SKNE      R0,IFPTRA
601 0876 2102 A      JMP        .+3
602 0877 4C12 A      LI         R0,18;      NESTING USAGE ERROR
603 0878 2CAA I      JSR        ERROR
604 0879 807A B      LD         R0,EXPVAL
605 087A 2CBE I      JSR        OVAL
606 087B 2CAC I      JSR        OIBREP      ;OUTPUT INPUT BUFFER,REPORT ERRS.
607 087C 805D B      LD         R0,PASS
608 087D C1E8 A      ADD        R0,$X2031
609 087E B0BF I      ST         R0,MSGP
610 087F 805D B      LD         R0,PASS
611 0880 1102 A      BOC       Z,ENDP1
612 0881 1459 A      BOC       B1EQ1,ENDP3

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613 0882 1326 A      BOC      ODD,ENDP2
614 0883            ;
615 0883            ;      END PASS 1
616 0883            ;
617 0883            ENDP1:
618 0883 4C00 A      LI      R0,0
619 0884 A154 A      ST      R0,TLAST
620 0885 A154 A      ST      R0,OLAST
621 0886 4D01 A      LI      R1,1
622 0887 8091 B      LD      R0,NOLIST
623 0888 C08F B      ADD      R0,ERRLIST
624 0889 D026 B      SUB      R0,K1
625 088A 1501 A      BOC      NZ,+.2
626 088B 4D02 A      LI      R1,2
627 088C            .IF      SIZE8
628 088C F440 B      SKNE     R1,K2
629 088D 2108 A      JMP      $EP1
630 088E 8090 B      LD      R0,OBJMOD
631 088F 1106 A      BOC      Z,$EP1
632 0890 8096 B      LD      R0,HSPR
633 0891 1103 A      BOC      Z,$EP2
634 0892 801E B      LD      R0,DSKOBJ
635 0893 C040 B      ADD      R0,K2
636 0894 1101 A      BOC      Z,$EP1
637 0895 4D03 A      SEP2:    LI      R1,3
638 0896            SEP1:
639 0896            .ENDIF
640 0896 A45D B      ST      R1,PASS
641 0897 8020 B      LD      R0,DSKTMP
642 0898 1B02 A      BOC      LEZ,$51
643 0899 2C1C B      JSR      @CLOSET
644 089A A13E A      ST      R0,TLAST
645 089B 8096 B      $51:    LD      R0,HSPR
646 089C 1502 A      BOC      NZ,+.3
647 089D 9CC0 I      LD      R3,$TTL
648 089E 2C1B B      JSR      @MESS
649 089F 2CC1 I      JSR      OEPM
650 08A0 805D B      LD      R0,PASS
651 08A1 1410 A      BOC      BLEQ1,BEGP34      ;BEGIN PASS 3 OR 4
652 08A2            ;
653 08A2            ;      BEGIN PASS 2
654 08A2            ;
655 08A2 2CC2 I      JSR      RESETP      ;RESET P BITS IN SYMBOL TABLE
656 08A3 2CC3 I      JSR      PINIT
657 08A4 808F B      LD      R0,ERRLIST
658 08A5 A08E B      ST      R0,LISTMD
659 08A6 4F06 A      LI      R3,6
660 08A7 2CA2 I      JSR      MANYNL
661 08A8 24C4 I      JMP      NEXTST
662 08A9            ;
663 08A9            ;      END PASS 2
664 08A9            ;
665 08A9            ENDP2:
666 08A9 2CC5 I      JSR      OPTRS      ;OUTPUT ALL POINTERS
667 08AA 8093 B      LD      R0,NOMAP
668 08AB 1102 A      BOC      Z,+.3
669 08AC 2CC6 I      JSR      OMAP
670 08AD 2101 A      JMP      .+2
671 08AE 2CC2 I      JSR      RESETP
672 08AF 2919 A      JSR      $EL
673 08B0 2CC1 I      JSR      OEPM
674 08B1 785D B      ISZ      PASS
675 08B2            BEGP34:

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676 08B2 8090 B      LD      R0,OBJMOD
677 08B3 1145 A      BOC     Z,$FINIS
678 08B4 801E B      LD      R0,DSKOBJ
679 08B5 1206 A      BOC     P,$50
680 08B6 9CC7 I      LD      R3,MSGTO
681 08B7 AC97 B      ST      R3,TYPMOD
682 08B8 2C9B I      JSR     ONLMSG
683 08B9 2CA5 I      JSR     NEWLIN
684 08BA 0000 A      HALT
685 08BB 2CC8 I      JSR     LEAD          ;WAIT FOR PT PUNCH ON
686 08BC              ;
687 08BC              $50:
688 08BC 805B B      LD      R0,TMAX
689 08BD B0C9 I      ST      R0,TTLBUF+3
690 08BE 805A B      LD      R0,BMAX
691 08BF B0CA I      ST      R0,TTLBUF+2
692 08C0 8D6E A      LD      R3,$TTL
693 08C1 2CCB I      JSR     CKPNCH          ;CHECKSUM AND PUNCH
694 08C2 2CCC I      JSR     OGLOB
695 08C3 2CC3 I      JSR     PINIT
696 08C4 805D B      LD      R0,PASS
697 08C5 848F B      LD      R1,ERRRLST
698 08C6 F027 B      SKNE    R0,K3
699 08C7 A48E B      ST      R1,LISTMD
700 08C8 24C4 I      JMP     NEXTST
701 08C9              ;
702 08C9              ;      OUTPUT ERROR LINES
703 08C9              ;
704 08C9 4C01 A      SEL:    LI      R0,1
705 08CA A08E B      ST      R0,LISTMD
706 08CB 2CA5 I      JSR     NEWLIN
707 08CC 8888 B      LD      R2,EC
708 08CD 4D20 A      LI      R1,020
709 08CE 8109 A      LD      R0,$NO
710 08CF F831 B      SKNE    R2,X6666
711 08D0 2CCD I      JSR     O2CH
712 08D1 F831 B      SKNE    R2,X6666
713 08D2 2101 A      JMP     .+2
714 08D3 2CCE I      JSR     OSPDEC
715 08D4 9CCF I      LD      R3,MSGNOE          ;'ERROR LINES'
716 08D5 2CD0 I      JSR     OMSG
717 08D6 0200 A      RTS
718 08D7              ;
719 08D7 08D8 A      $TMP:    .+.1
720 08D8 4E4F A      $NO:     .WORD    'NO'
721 08D9 08DA A      TLAST:   .+.1
722 08DA 08DB A      OLAST:   .+.1
723 08DB              ;
724 08DB              ;
725 08DB              ;
726 08DB              ENDP3:
727 08DB 2967 A      JSR     OPTRS
728 08DC              .IF
729 08DC 805D B      LD      R0,PASS
730 08DD D027 B      SUB     R0,K3
731 08DE 1504 A      BOC     NZ,$OE
732 08DF 8093 B      LD      R0,NOMAP
733 08E0 1102 A      BOC     Z,$OE
734 08E1 2CC6 I      JSR     OMAP
735 08E2 29E6 A      JSR     $EL
736 08E3              .ENDIF
737 08E3              $OE:
738 08E3 4C01 A      LI      R0,1

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739 08E4 A08E B      ST      R0,LISTMD
740 08E5 807A B      LD      R0,EXPVAL      ;EXPRESSION VALUE
741 08E6 A14D A      ST      R0,ENDBUF+3
742 08E7 807C B      LD      R0,EXPREL      ;EXPRESSION RELOCATION MODE
743 08E8 1101 A      BOC      Z,+.2
744 08E9 D026 B      SUB      R0,K1
745 08EA A148 A      ST      R0,ENDBUF+2
746 08EB 8D44 A      LD      R3,SEB
747 08EC 2CCB I      JSR      CKPNCH
748 08ED 801E B      LD      R0,DSKOBJ
749 08EE 1B03 A      BOC      LEZ,+.4
750 08EF 2C1D B      JSR      @CLOSEO
751 08F0 A1E9 A      ST      R0,OLAST
752 08F1 2102 A      JMP      .+3
753 08F2 2CC8 I      JSR      LEAD      ;OUTPUT LEADER TO PT
754 08F3 0000 A      HALT      ; WAIT FOR PT PUNCH OFF
755 08F4 2942 A      JSR      OEPM
756 08F5 9CD1 I      LD      R3,MSGOCK      ;'OBJECT CHECKSUM ='
757 08F6 2CD0 I      JSR      OMSG
758 08F7 813E A      LD      R0,OBJCK      ;OBJECT CHECKSUM
759 08F8 2CD2 I      JSR      OHEX
760 08F9          $FINIS:
761 08F9          .IF      SIZE8
762 08F9 81DF A      LD      R0,TLAST
763 08FA 1105 A      BOC      Z,$FIN2
764 08FB 8D0C A      LD      R3,$M1
765 08FC 2C9B I      JSR      ONLMSG
766 08FD 81DB A      LD      R0,TLAST
767 08FE D026 B      SUB      R0,K1
768 08FF 2CD2 I      JSR      OHEX
769 0900 81D9 A      $FIN2: LD      R0,OLAST
770 0901 1120 A      BOC      Z,$FIN3
771 0902 8D13 A      LD      R3,$M2
772 0903 2C9B I      JSR      ONLMSG
773 0904 81D5 A      LD      R0,OLAST
774 0905 D026 B      SUB      R0,K1
775 0906 2CD2 I      JSR      OHEX
776 0907 211A A      JMP      $FIN3
777 0908 0909 A      $M1:   .WORD      .+1
778 0909 4C41 A      .ASCII  'LAST TEMP SECTOR (HEX)='
      090A 5354 A
      090B 2054 A
      090C 454D A
      090D 5020 A
      090E 5345 A
      090F 4354 A
      0910 4F52 A
      0911 2028 A
      0912 4845 A
      0913 5829 A
      0914 3D20 A
779 0915 0000 A      .WORD      0
780 0916 0917 A      $M2:   .WORD      .+1
781 0917 4C41 A      .ASCII  'LAST OBJ SECTOR (HEX)='
      0918 5354 A
      0919 204F A
      091A 424A A
      091B 2053 A
      091C 4543 A
      091D 544F A
      091E 5220 A
      091F 2848 A
      0920 4558 A

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0921 293D A
782 0922 $FIN3:
783 0922 8096 B LD R0,HSPR
784 0923 1505 A BOC NZ,$FIN1
785 0924 4C0D A LI R0,0D
786 0925 2C1A B JSR @HSPRT
787 0926 4C0C A LI R0,0C
788 0927 2C1A B JSR @HSPRT
789 0928 2C1A B JSR @HSPRT
790 0929 .ENDIF
791 0929 24D3 I $FIN1: JMP NEWASM
792 092A ;
793 092A ;
794 092A 2CAC I ENDP4: JSR OIBREP ;OUTPUT INPUT BUFFER,REPORT ERRS.
795 092B 2917 A JSR OPTRS ;OUTPUT POINTERS
796 092C 2CC6 I JSR OMAP
797 092D 21B5 A JMP $OE ;OUTPUT END RECORD
798 092E ;
799 092E 2031 A X2031: .WORD 02031
800 092F 0719 A $TTL: .WORD TTLBUF
801 0930 0931 A $EB: .WORD ENDBUF
802 0931 C004 A ENDBUF: .WORD 0C004
803 0932 0935 A .=.+3
804 0935 0936 A SOUCK: .=.+1
805 0936 0937 A OBJCK: .=.+1
806 0937 ;
807 0937 ; OUTPUT END PASS X MESSAGE
808 0937 ;
809 0937 OEPM:
810 0937 8D3C A LD R3,MSGEP
811 0938 AC97 B ST R3,TYPMOD
812 0939 2C9B I JSR ONLMSG ;'END PASS 1'
813 093A 8096 B LD R0,HSPR
814 093B A097 B ST R0,TYPMOD
815 093C 813C A LD R0,MSGP
816 093D F1F0 A SKNE R0,X2031
817 093E 0200 A RTS
818 093F 8D3B A LD R3,MSGSOV
819 0940 2C9B I JSR ONLMSG
820 0941 81F3 A LD R0,SOUCK
821 0942 24D2 I JMP OHEX
822 0943 ;
823 0943 ;
824 0943 ; OUTPUT POINTERS
825 0943 ;
826 0943 OPTRS:
827 0943 2CA5 I JSR NEWLIN
828 0944 2CD4 I JSR O6B
829 0945 4F02 A LI R3,2
830 0946 AC6B B ST R3,SECT
831 0947 8057 B LD R0,BCTR
832 0948 A05C B ST R0,LOCCTR
833 0949 9CD5 I LD R3,PTABF
834 094A AD8C A ST R3,$TMP
835 094B 2CA9 I JSR INITOR
836 094C $NP:
837 094C 8D8A A LD R3,$TMP
838 094D 8300 A LD R0,0(R3)
839 094E 1501 A BOC NZ,+.2
840 094F 24BC I JMP OOREC
841 0950 3181 A RCPY R0,R1
842 0951 8301 A LD R0,1(R3)
843 0952 2CAB I JSR OUTWRD

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844 0953 7983 A      ISZ      $TMP
845 0954 7982 A      ISZ      $TMP
846 0955 21F6 A      JMP      $NP          ;LOOP FOR NEXT PTR
847 0956          ;      END OF POINTER OUTPUT
848 0956          ;
849 0956 0957 A MSGBEG: .WORD      .+1
850 0957 4E53 A      .ASCII    'NSC IMP-16 ASSEMBLER'
      0958 4320 A
      0959 494D A
      095A 502D A
      095B 3136 A
      095C 2041 A
      095D 5353 A
      095E 454D A
      095F 424C A
      0960 4552 A
851 0961 0D0A A      .WORD      0D0A
852 0962 4D45 A      .ASCII    'MEMORY ='
      0963 4D4F A
      0964 5259 A
      0965 203D A
853 0966 0000 A      .WORD      0
854 0967 0968 A MSGNXT: .WORD      .+1
855 0968 4E45 A      .ASCII    'NEXT ASSEMBLY'
      0969 5854 A
      096A 2041 A
      096B 5353 A
      096C 454D A
      096D 424C A
      096E 5920 A
856 096F 0D0A A      .WORD      0D0A
857 0970 2A2E A      .ASCII    '*.ASM'
      0971 4153 A
      0972 4D20 A
858 0973 0000 A      .WORD      0
859 0974 0975 A MSGEP: .WORD      .+1
860 0975 454E A      .ASCII    'END PASS'
      0976 4420 A
      0977 5041 A
      0978 5353 A
861 0979 0000 A MSGP:  .WORD      0
862 097A 0000 A      .WORD      0
863 097B 097C A MSGSOV: .WORD      .+1
864 097C 534F A      .ASCII    'SOURCE CK.='
      097D 5552 A
      097E 4345 A
      097F 2043 A
      0980 4B2E A
      0981 3D20 A
865 0982 0000 A      .WORD      0
866 0983 0984 A MSGTO: .WORD      .+1
867 0984 5455 A      .ASCII    'TURN PT PUNCH ON AND PUSH RUN'
      0985 524E A
      0986 2050 A
      0987 5420 A
      0988 5055 A
      0989 4E43 A
      098A 4820 A
      098B 4F4E A
      098C 2041 A
      098D 4E44 A
      098E 2050 A
      098F 5553 A

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0990 4820 A
0991 5255 A
0992 4E20 A
868 0993 0000 A      .WORD      0
869 0994 0995 A MSGOCK: .WORD      .+1
870 0995 204F A      .ASCII      ' OBJ.CK.= '
      0996 424A A
      0997 2E43 A
      0998 4B2E A
      0999 3D20 A
871 099A 0000 A      .WORD      0
872 099B 099C A MSGNOE: .WORD      .+1
873 099C 2045 A      .ASCII      ' ERROR LINES '
      099D 5252 A
      099E 4F52 A
      099F 204C A
      09A0 494E A
      09A1 4553 A
874 09A2 0000 A      .WORD      0

875 09A3      .PAGE      'IF,ELSE,ENDIF DIRECTIVES'
876 09A3      .LOCAL
877 09A3      ;
878 09A3      ;      IF,ELSE,ENDIF DIRECTIVES
879 09A3      ;
880 09A3      IF:
881 09A3 9070 B      LD      R0,IFMODE
882 09A4 C06F B      ADD      R0,IFSTAT
883 09A5 8C6D B      LD      R3,IFPTR
884 09A6 FD2D A      SKNE     R3,IFTBL
885 09A7 210F A      JMP      SOV      ;IF TABLE OVERFLOW
886 09A8 786D B      ISZ      IFPTR
887 09A9 A301 A      ST      R0,1(R3)
888 09AA 4C02 A      LI      R0,2
889 09AB A06F B      ST      R0,IFSTAT
890 09AC 2CB8 I      JSR      EXPABS
891 09AD 210C A      JMP      SNOEX      ;ERROR - NO EXP
892 09AE E023 B      SKG      R0,ZERO
893 09AF 4C00 A      LI      R0,0
894 09B0 1101 A      BOC      Z,+.2
895 09B1 4C01 A $1:  LI      R0,1
896 09B2 6070 B      AND      R0,IFMODE
897 09B3 A070 B      ST      R0,IFMODE
898 09B4 807A B      LD      R0,EXPVAL      ;EXPRESSION VALUE
899 09B5 2CD6 I      JSR      OHEXIF
900 09B6 24D7 I      JMP      DIREND
901 09B7      ;
902 09B7      ;      IF TABLE OVERFLOW
903 09B7 4C24 A SOV:  LI      R0,36;      TABLE OVERFLOW ERROR
904 09B8 2CAA I      JSR      ERROR
905 09B9 24D7 I      JMP      DIREND
906 09BA      ;      NO EXP ERROR
907 09BA 4C2A A $NOEX: LI      R0,42;      UNDEFINED ERROR
908 09BB 2CAA I      JSR      ERROR
909 09BC 21F4 A      JMP      $1
910 09BD      ;
911 09BD      ;      ELSE DIRECTIVE
912 09BD      ;
913 09BD      ELSE:
914 09BD 806F B      LD      R0,IFSTAT      ;IF STATUS
915 09BE F040 B      SKNE     R0,K2
916 09BF 2103 A      JMP      $ELOC      ;ELSE OK

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917 09C0      ;      NESTING ERROR
918 09C0 4C12 A $NERR: LI      R0,18;      NESTING - USAGE ERROR
919 09C1 2CAA I      JSR      ERROR
920 09C2 24D7 I      JMP      DIREND
921 09C3      ;      ELSE OK
922 09C3      $ELOK:
923 09C3 4C04 A      LI      R0,4
924 09C4 A06F B      ST      R0,IFSTAT
925 09C5 9070 B      LD      R0,IFMODE
926 09C6 5000 A      CAI      R0,0
927 09C7 6026 B      AND      R0,K1
928 09C8 A070 B      ST      R0,IFMODE      ;COMPLEMENT IF MODE
929 09C9 24D7 I      JMP      DIREND
930 09CA      ;
931 09CA      ;      ENDF DIRECTIVE
932 09CA      ;
933 09CA      ENDF:
934 09CA 806F B      LD      R0,IFSTAT
935 09CB 11F4 A      BOC      Z,$NERR      ;NESTING ERROR
936 09CC 906D B      LD      R0,@IFPTR
937 09CD 6026 B      AND      R0,K1
938 09CE A070 B      ST      R0,IFMODE
939 09CF 906D B      LD      R0,@IFPTR
940 09D0 6028 B      AND      R0,K6      ;STATUS
941 09D1 A06F B      ST      R0,IFSTAT
942 09D2 7C6D B      DSZ      IFPTR
943 09D3 24D7 I      JMP      DIREND
944 09D4      ;
945 09D4 0718 A IFTBL: .WORD    IFTAB+9      ;IF TABLE LIMIT
946 09D5      .IF      SIZE8

947 09D5      .PAGE    'FORM DIRECTIVE'
948 09D5      .LOCAL
949 09D5      ;
950 09D5      ;      FORM DIRECTIVE
951 09D5      ;
952 09D5 2CB3 I FORM: JSR      IFBYP
953 09D6 4C00 A      LI      R0,0
954 09D7 A075 B      ST      R0,FORMB      ;FORM FIELD BEGIN BITS
955 09D8 A076 B      ST      R0,FORMT      ;FORM FIELD TERMINAL BITS
956 09D9 A164 A      ST      R0,FORMV
957 09DA 4C01 A      LI      R0,1
958 09DB A164 A      ST      R0,FRMREL
959 09DC 4C0F A      LI      R0,15
960 09DD A15E A      ST      R0,$BBIT
961 09DE 2CD8 I      JSR      GFORM      ;GET FORM NAME
962 09DF 24D9 I      JMP      XERROR      ;SYNTAX ERROR - NO SYMBOL
963 09E0 4300 A      PUSH     R3
964 09E1 2CB6 I      JSR      DISER
965 09E2 2101 A      JMP      .+2
966 09E3 2155 A      JMP      $20
967 09E4 4700 A      PULL     R3
968 09E5 83FF A      LD      R0,-1(R3)
969 09E6 7029 B      SKAZ     R0,K8
970 09E7 2151 A      JMP      $20      ;DUP DEF ERROR
971 09E8 AD54 A      ST      R3,$FPTR      ;FORM PTR
972 09E9 8074 B      LD      R0,FORMPT
973 09EA A154 A      ST      R0,$FFFF
974 09EB      ;
975 09EB      $LOOP:
976 09EB 2C9D I      JSR      GCOMMA
977 09EC 213E A      JMP      $END

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978 09ED 814E A      LD      R0,$BBIT      ;BEGIN BIT NUM (15 TO 0)
979 09EE 1203 A      BOC      P,$10
980 09EF 4C12 A $11:  LI      R0,18;      USAGE ERROR
981 09F0 2CAA I      JSR      ERROR
982 09F1 2139 A      JMP      $END
983 09F2 ;
984 09F2 2CDA I $10:  JSR      EXPP7
985 09F3 21FB A      JMP      $11
986 09F4 D147 A      SUB      R0,$BBIT
987 09F5 D040 B      SUB      R0,K2
988 09F6 12F8 A      BOC      P,$11      ;ERROR - FIELD SIZE TOO LARGE
989 09F7 ;
990 09F7 2C9E I      JSR      GNVC
991 09F8 2103 A      JMP      $12
992 09F9 F046 B      SKNE     R0,LPAREN      ; (
993 09FA 2113 A      JMP      $13      ; YES-LEFT PAREN.
994 09FB 7C5E B      DSZ      INPTR      ;INPUT CHAR PTR
995 09FC ;
996 09FC 804D B $12:  LD      R0,SHLIN      ;SHL R0,0
997 09FD C13E A      ADD      R0,$BBIT
998 09FE A101 A      ST       R0,$4      ; *** CAREFUL
999 09FF 4C01 A      LI       R0,1
1000 0A00 5C00 A $4:  SHL      R0,0      ; ***
1001 0A01 C075 B      ADD      R0,FORMB      ;FORM FIELD BEGIN BITS
1002 0A02 A075 B      ST       R0,FORMB      ;FORM FIELD BEGIN BITS ;SET BEG BIT
1003 0A03 8138 A      LD      R0,$BBIT
1004 0A04 D07A B      SUB      R0,EXPVAL      ;EXPRESSION VALUE
1005 0A05 A136 A      ST       R0,$BBIT      ;UPDATE NEW $BBIT
1006 0A06 C026 B      ADD      R0,K1
1007 0A07 C04D B      ADD      R0,SHLIN      ;SHL R0,0
1008 0A08 A101 A      ST       R0,$5      ;*** CAREFUL
1009 0A09 4C01 A      LI       R0,1
1010 0A0A 5C00 A $5:  SHL      R0,0      ; ***
1011 0A0B C076 B      ADD      R0,FORMT      ;FORM FIELD TERMINAL BITS
1012 0A0C A076 B      ST       R0,FORMT      ;FORM FIELD TERMINAL BITS ;SET TERMINA
1013 0A0D 21DD A      JMP      $LOOP      ;LOOP
1014 0A0E ;
1015 0A0E ;
1016 0A0E 812D A $13:  LD      R0,$BBIT
1017 0A0F D07A B      SUB      R0,EXPVAL      ;EXPRESSION VALUE
1018 0A10 A12B A      ST       R0,$BBIT
1019 0A11 C04D B      ADD      R0,SHLIN
1020 0A12 C026 B      ADD      R0,K1
1021 0A13 A10F A      ST       R0,$3      ;*** CAREFUL
1022 0A14 804D B      LD      R0,SHLIN
1023 0A15 C07A B      ADD      R0,EXPVAL
1024 0A16 A101 A      ST       R0,$2      ;*** CAREFUL
1025 0A17 4C01 A      LI       R0,1
1026 0A18 5C00 A $2:  SHL      R0,0      ;***
1027 0A19 D026 B      SUB      R0,K1
1028 0A1A 5000 A      CAI      R0,0
1029 0A1B 1505 A      BOC      NZ,$2A
1030 0A1C ;
1031 0A1C 2CB9 I      SPECIAL CASE 16 BIT FORM
1032 0A1D 21D1 A      JSR      EXP
1033 0A1E 6427 B      JMP      $11
1034 0A1F A520 A      AND      R1,K3
1035 0A20 2102 A      ST       R1,FRMREL
1036 0A21 $2A:      JMP      $3
1037 0A21 2CDB I      JSR      EXPFRM      ;GET EXP,MASK IN R0
1038 0A22 21CC A      JMP      $11      ;ERROR
1039 0A23 5C00 A $3:  SHL      R0,0      ;***
1040 0A24 C119 A      ADD      R0,FORMV

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1041 0A25 A118 A      ST      R0,FORMV
1042 0A26 2C9E I      JSR      GNVC
1043 0A27 21C7 A      JMP      $11                      ;NO CLOSING PAREN - ERROR
1044 0A28 F043 B      SKNE     R0,RPAREN
1045 0A29 21C1 A      JMP      $LOOP
1046 0A2A 21C4 A      JMP      $11                      ;NO COSING PAREN - ERROR
1047 0A2B          ;
1048 0A2B          ;
1049 0A2B 8D11 A $END: LD      R3,$FPTR                ; PTS. TO LOWEST WORD OF ENTRY
1050 0A2C 8912 A      LD      R2,$FFFF                ;SAVED FORMPT
1051 0A2D 8110 A      LD      R0,FORMV
1052 0A2E A3FE A      ST      R0,-2(R3)
1053 0A2F 83FF A      LD      R0,-1(R3)
1054 0A30 602E B      AND      R0,XFFFF0
1055 0A31 C029 B      ADD      R0,K8
1056 0A32 C10D A      ADD      R0,FRMREL
1057 0A33 A3FF A      ST      R0,-1(R3)
1058 0A34 8075 B      LD      R0,FORMB                ;FORM FIELD BEGIN BITS
1059 0A35 A201 A      ST      R0,1(R2)
1060 0A36 8076 B      LD      R0,FORMT                ;FORM FIELD TERMINAL BITS
1061 0A37 A200 A      ST      R0,0(R2)
1062 0A38 24D7 I      JMP      DIREND
1063 0A39          ;
1064 0A39          ;
1065 0A39 4C30 A $20: LI      R0,48;                    DUP DEF ERROR
1066 0A3A 2CAA I      JSR      ERROR
1067 0A3B 24D7 I      JMP      DIREND
1068 0A3C          ;
1069 0A3C 0A3D A $BBIT: .=.+1                          ;BEGIN BIT NUM (15 TO 0)
1070 0A3D 0A3E A $FPTR: .=.+1
1071 0A3E 0A3F A FORMV: .=.+1                          ;VALUE
1072 0A3F 0A40 A $FFFF: .=.+1                          ;TEMP FOR FORMPT
1073 0A40 0A41 A FRMREL: .=.+1
1074 0A41          .ENDIF

1075 0A41          .PAGE   'ASECT,BSECT,TSECT AND EXTD DIRECTIVES'
1076 0A41          ;
1077 0A41          ;   ASECT,BAECT,TSECT, AND EXTD DIRECTIVES
1078 0A41          ;
1079 0A41          .LOCAL
1080 0A41 4F01 A ASECT: LI      R3,1
1081 0A42          $1:
1082 0A42 2CB3 I      JSR      IFBYP
1083 0A43 886B B      LD      R2,SECT
1084 0A44 805C B      LD      R0,LOCCTR
1085 0A45 A255 B      ST      R0,ACTR-1(R2)
1086 0A46 8658 B      LD      R1,AMAX-1(R2)
1087 0A47 2910 A      JSR      MAXR1                    ;SET R1 = MAX OF R1 AND R0
1088 0A48 A658 B      ST      R1,AMAX-1(R2)
1089 0A49 8755 B      LD      R1,ACTR-1(R3)
1090 0A4A AC6B B      ST      R3,SECT
1091 0A4B A45C B      ST      R1,LOCCTR
1092 0A4C 2CBC I      JSR      OOREC                    ;OUTPUT OBJECT RECORD IF ANY
1093 0A4D 805C B      LD      R0,LOCCTR
1094 0A4E 2CBE I      JSR      OVAL
1095 0A4F 24D7 I      JMP      DIREND
1096 0A50          ;
1097 0A50 4F02 A BSECT: LI      R3,2
1098 0A51 21F0 A      JMP      $1
1099 0A52          ;
1100 0A52 4F03 A TSECT: LI      R3,3
1101 0A53 21EE A      JMP      $1

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1102 0A54      ;
1103 0A54      ;
1104 0A54      EXTD:
1105 0A54 2CB3 I      JSR      IFBYP
1106 0A55 4C01 A      LI       R0,1
1107 0A56 A069 B      ST       R0,XINOK
1108 0A57 24D7 I      JMP      DIREND
1109 0A58      ;
1110 0A58      ;      PUT MAX OF R0 AND R1 IN R1
1111 0A58      ;
1112 0A58 A109 A MAXR1: ST      R0,$TMP
1113 0A59 3482 A      RXOR     R1,R0
1114 0A5A 1204 A      BOC      P,$SAME
1115 0A5B 8106 A      LD       R0,$TMP
1116 0A5C 1201 A      BOC      P,+.2
1117 0A5D 8504 A      LD       R1,$TMP
1118 0A5E 0200 A      RTS
1119 0A5F      ;      SAME SIGN
1120 0A5F E502 A $SAME: SKG     R1,$TMP
1121 0A60 8501 A      LD       R1,$TMP
1122 0A61 0200 A      RTS
1123 0A62 0A63 A STMP:  .=.+1

1124 0A63      .PAGE      'GLOBL,LOCAL,ASCII AND WORD DIRECTIVES'
1125 0A63      .LOCAL
1126 0A63      ;
1127 0A63      ;      GLOBL,LOCAL,ASCII AND WORD DIRECTIVES
1128 0A63      ;
1129 0A63      GLOBL:
1130 0A63 2CB3 I      JSR      IFBYP      ;IF BYPASS
1131 0A64 2CDC I      JSR      GSYM
1132 0A65 210E A      JMP      $4      ;NO SYMBOL
1133 0A66 8300 A $1:  LD       R0,0(R3)
1134 0A67 6029 B      AND      R0,K8
1135 0A68 1508 A      BOC      NZ,$3      ; ERROR-LOCAL CAN NOT BE MADE GLOBL
1136 0A69      ;      SET GLOBL BIT
1137 0A69 83FF A      LD       R0,-1(R3)
1138 0A6A 682C B      OR       R0,K4
1139 0A6B A3FF A      ST       R0,-1(R3)      ;SET GLOBL BIT
1140 0A6C      $1A:
1141 0A6C 2C9D I      JSR      GCOMMA
1142 0A6D 24D7 I      JMP      DIREND
1143 0A6E 2CDC I      JSR      GSYM
1144 0A6F 24D7 I      JMP      DIREND      ;LIST EXHAUSTED
1145 0A70 21F5 A      JMP      $1      ;LOOP
1146 0A71      ;
1147 0A71 4C12 A $3:  LI       R0,18;      USAGE ERROR      ;CONTRADICTION - GLOBL
1148 0A72 2CAA I $2:  JSR      ERROR
1149 0A73 21F8 A      JMP      $1A
1150 0A74 4C00 A $4:  LI       R0,0;      MISSING ARG. ERROR      ; ERROR - MISS
1151 0A75 21FC A      JMP      $2
1152 0A76      ;
1153 0A76      ;      LOCAL DIRECTIVE
1154 0A76      ;
1155 0A76      LOCAL:
1156 0A76 2CB3 I      JSR      IFBYP      ;IF BYPASS
1157 0A77 4C01 A      LI       R0,1
1158 0A78 C06C B      ADD      R0,LOCREG
1159 0A79 E03B B      SKG      R0,HEX3F
1160 0A7A 2103 A      JMP      $5
1161 0A7B 4C24 A      LI       R0,36;      TABLE OVERFLOW ERROR      ;ERROR - 63 L
1162 0A7C 2CAA I      JSR      ERROR

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1163 0A7D 24D7 I      JMP      DIREND
1164 0A7E A06C B $5:   ST        R0,LOCREG
1165 0A7F 24D7 I      JMP      DIREND
1166 0A80           ;
1167 0A80           ;      WORD DIRECTIVE
1168 0A80           ;
1169 0A80           WORD:
1170 0A80 2CB3 I      JSR      IFBYP      ;IF BYPASS
1171 0A81 2CB9 I      JSR      EXP
1172 0A82 24BB I      JMP      ERRST
1173 0A83 2CAB I $6:   JSR      OUTWRD      ;OUTPUT WORD
1174 0A84 2C9D I      JSR      GCOMMA
1175 0A85 24BA I      JMP      ENDST
1176 0A86 2CB9 I      JSR      EXP      ;GET EXPRESSION
1177 0A87 24BA I      JMP      ENDST
1178 0A88 21FA A      JMP      $6
1179 0A89           ;
1180 0A89           ;      ASCII DIRECTIVE
1181 0A89           ;
1182 0A89           ASCII:
1183 0A89 2CB3 I      JSR      IFBYP
1184 0A8A 2CDD I      JSR      GNSTRG      ;GET NEW STRING
1185 0A8B 2108 A      JMP      $10      ;ERROR - NONE
1186 0A8C 4D01 A $12:  LI        R1,1      ;RELOCATION=ABS
1187 0A8D 2CAB I      JSR      OUTWRD      ;OUTPUT WORD
1188 0A8E 2CDE I      JSR      GCSTRG      ;GET CONTINUATION OF STRING
1189 0A8F 2101 A      JMP      $11      ;STRING END
1190 0A90 21FB A      JMP      $12
1191 0A91           ;      IS THERE ANOTHER STRING
1192 0A91 2C9D I $11:  JSR      GCOMMA      ;GET COMMA
1193 0A92 24BA I      JMP      ENDST
1194 0A93 21F5 A      JMP      ASCII      ;COMMA
1195 0A94           ;      ERROR
1196 0A94 4C18 A $10:  LI        R0,24;      SYNTAX ERROR
1197 0A95 2CAA I      JSR      ERROR
1198 0A96 24D7 I      JMP      DIREND

1199 0A97           .PAGE      'PAGE SPACE AND LIST DIRECTIVES'
1200 0A97           ;
1201 0A97           ;      PAGE,SPACE AND LIST DIRECTIVES
1202 0A97           ;
1203 0A97           .LOCAL
1204 0A97 2926 A PAGE: JSR      $BYP1      ;BYPASS IF PASS 1
1205 0A98 2CB3 I      JSR      IFBYP
1206 0A99 4FE2 A      LI        R3,-30      ;MAX. 60 CHAR. STRING
1207 0A9A AD37 A      ST        R3,$T1
1208 0A9B 2CDD I      JSR      GNSTRG      ;GET NEW STRING
1209 0A9C 210C A      JMP      $1      ;NO STRING
1210 0A9D 2102 A      JMP      $3
1211 0A9E 2CDE I $2:   JSR      GCSTRG      ;GET NXT 2 CARS OF STRING
1212 0A9F 2105 A      JMP      $4      ;NONE LEFT
1213 0AA0           $3:
1214 0AA0 8931 A      LD        R2,$T1
1215 0AA1 C931 A      ADD      R2,$PGBF
1216 0AA2 A200 A      ST        R0,0(R2)
1217 0AA3 792E A      ISZ      $T1
1218 0AA4 21F9 A      JMP      $2
1219 0AA5 892C A $4:   LD        R2,$T1
1220 0AA6 C92C A      ADD      R2,$PGBF
1221 0AA7 4C00 A      LI        R0,0
1222 0AA8 A200 A      ST        R0,0(R2)      ;SET END MSG INDICATOR
1223 0AA9           ;      EJECT PAGE AND PRINT

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1224 0AA9 4F07 A $1:    LI      R3,7
1225 0AAA CC71 B      ADD     R3,PGRL      ;PAGE REMAINING LINES
1226 0AAB 2CDF I      JSR     OPGSTR      ;OUTPUT PAGE STRING
1227 0AAC 2CD4 I      JSR     O6B
1228 0AAD 24D7 I      JMP     DIREND
1229 0AAE          ;
1230 0AAE 290F A SPACE: JSR     $BYPL      ;BYPASS IF PASS 1
1231 0AAF 2CB3 I      JSR     IFBYP
1232 0AB0 2CE0 I      JSR     EXPP        ;GET EXP POSITIVE
1233 0AB1 3081 A      NOP
1234 0AB2 E071 B      SKG     R0,PGRL
1235 0AB3 2101 A      JMP     .+2
1236 0AB4 21F4 A      JMP     $1
1237 0AB5 3381 A      RCPY    R0,R3
1238 0AB6 5001 A      CAI     R0,1
1239 0AB7 C071 B      ADD     R0,PGRL
1240 0AB8 A071 B      ST      R0,PGRL
1241 0AB9 4300 A      PUSH    R3
1242 0ABA 2CAC I      JSR     OIBREP
1243 0ABB 4700 A      PULL    R3
1244 0ABC 2CA2 I      JSR     MANYNL
1245 0ABD 24C4 I      JMP     NEXTST
1246 0ABE          ;
1247 0ABE 805D B $BYPL: LD      R0,PASS
1248 0ABF 1301 A      BOC     ODD,+.2
1249 0AC0 24D7 I      JMP     DIREND
1250 0AC1 0200 A      RTS
1251 0AC2          ;
1252 0AC2          LIST:
1253 0AC2 2CB3 I      JSR     IFBYP
1254 0AC3 2CB9 I      JSR     EXP
1255 0AC4 4C01 A      LI      R0,1
1256 0AC5 E023 B      SKG     R0,ZERO
1257 0AC6 4C00 A      LI      R0,0
1258 0AC7 1101 A      BOC     Z,+.2
1259 0AC8 4C01 A      LI      R0,1
1260 0AC9 4000 A      PUSH    R0
1261 0ACA 2CAC I      JSR     OIBREP
1262 0ACB 4400 A      PULL    R0
1263 0ACC 848F B      LD      R1,ERRLST      ;1=NORMAL LISTING 0=ERROR LISTING
1264 0ACD F426 B      SKNE    R1,K1
1265 0ACE A08E B      ST      R0,LISTMD      ;SET LISTING MODE
1266 0ACF 1501 A      BOC     NZ,+.2
1267 0AD0 2CA5 I      JSR     NEWLIN
1268 0AD1 24C4 I      JMP     NEXTST
1269 0AD2          ;
1270 0AD2 0000 A $T1:   .WORD    0
1271 0AD3          ;
1272 0AD3 070E A $PGBF: .WORD    PGSTRG+30
1273 0AD4          ;
1274 0AD4          ASMDIR:
1275 0AD4 2CB3 I      JSR     IFBYP
1276 0AD5 2CA4 I      JSR     PRCTRL
1277 0AD6 24D9 I      JMP     XERROR
1278 0AD7 24D7 I      JMP     DIREND

1279 0AD8          .PAGE    'TITLE DIRECTIVE'
1280 0AD8          .LOCAL
1281 0AD8          ;
1282 0AD8          ;      TITLE DIRECTIVE
1283 0AD8          ;
1284 0AD8          TITLE:

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1285 0AD8 2CB3 I      JSR      IFBYP
1286 0AD9 2C9E I      JSR      GNVC
1287 0ADA 24D9 I      JMP      XERROR
1288 0ADB 2CB0 I      JSR      BLDNAM
1289 0ADC 24D9 I      JMP      XERROR
1290 0ADD 805D B      LD       R0,PASS
1291 0ADE 1523 A      BOC      NZ,$5
1292 0ADF 4C10 A      LI       R0,16
1293 0AE0 B0E1 I      ST       R0,TTLBUF
1294 0AE1 807D B      LD       R0,NAM0      ;1ST 2 CHARACTERS OF NAME
1295 0AE2 5C01 A      SHL      R0,1
1296 0AE3 5CFF A      SHR      R0,1
1297 0AE4 B0E2 I      ST       R0,TTLBUF+4
1298 0AE5 807E B      LD       R0,NAM1      ;3RD AND 4TH CHARACTERS OF NAME
1299 0AE6 B0E3 I      ST       R0,TTLBUF+5
1300 0AE7 807F B      LD       R0,NAM2      ;5TH AND 6TH CHARACTERS OF NAME
1301 0AE8 B0E4 I      ST       R0,TTLBUF+6
1302 0AE9 8120 A      LD       R0,$PTR1
1303 0AEA A11E A      ST       R0,$PTR
1304 0AEB 2C9D I      JSR      GCOMMA
1305 0AEC 210E A      JMP      $BLNK      ;NO STRING,BLANK OUT BUFFER
1306 0AED 2CDD I      JSR      GNSTRG
1307 0AEE 24D9 I      JMP      XERROR
1308 0AEF B119 A      ST       R0,$PTR
1309 0AF0 7918 A $1:   ISZ      $PTR
1310 0AF1 8117 A      LD       R0,$PTR
1311 0AF2 F118 A      SKNE     R0,$PTL
1312 0AF3 2104 A      JMP      $2      ;TITLE BUFFER FULL
1313 0AF4 2CDE I      JSR      GCSTRG
1314 0AF5 2105 A      JMP      $BLNK      ;END OF STRING
1315 0AF6 B112 A      ST       R0,$PTR
1316 0AF7 21F8 A      JMP      $1      ;LOOP FOR REST OF STRING
1317 0AF8      ;      BUFFER FULL
1318 0AF8 2CDE I $2:   JSR      GCSTRG
1319 0AF9 24D7 I $4:   JMP      DIREND
1320 0AFA 21FD A      JMP      $2
1321 0AFB      ;
1322 0AFB      ;      BLANK OUT REST OF TITLE BUFFER
1323 0AFB      $BLNK:
1324 0AFB 4C00 A      LI       R0,0
1325 0AFC 8D0C A      LD       R3,$PTR
1326 0AFD A300 A $3:   ST       R0,0(R3)
1327 0AFE 4B01 A      AISZ     R3,1
1328 0AFF FD0B A      SKNE     R3,$PTL
1329 0B00 24D7 I      JMP      DIREND
1330 0B01 21FB A      JMP      $3      ;LOOP BACK
1331 0B02      ;
1332 0B02 2C9D I $5:   JSR      GCOMMA
1333 0B03 24D7 I      JMP      DIREND
1334 0B04 2CDD I      JSR      GNSTRG
1335 0B05 24D9 I      JMP      XERROR
1336 0B06 2CDE I      JSR      GCSTRG
1337 0B07 24D7 I      JMP      DIREND
1338 0B08 21FD A      JMP      .-2
1339 0B09      ;
1340 0B09 0B0A A $PTR:  .=. +1
1341 0B0A 0720 A $PTR1: .WORD   TTLBUF+7
1342 0B0B 072B A $PTL:  .WORD   TTLBUF+18

1343 0B0C      .PAGE   'PROCESS LABEL'
1344 0B0C      .LOCAL
1345 0B0C      ;

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1346 0B0C      ;      PROCESS LABEL:
1347 0B0C      ;
1348 0B0C      LABEL:
1349 0B0C 885E B      LD      R2,INPTR
1350 0B0D 82FF A      LD      R0,-1(R2)
1351 0B0E F034 B      SKNE    R0,BLANK
1352 0B0F 24D9 I      JMP      XERROR
1353 0B10 785E B      ISZ      INPTR          ;INPUT CHAR PTR
1354 0B11 2947 A      JSR      PREPLB
1355 0B12 24E5 I      JMP      NEXTLB          ;BYPASS LBL ASSIGNMENT,GO TO NEXT LBL
1356 0B13 8083 B      LD      R0,STPDEF
1357 0B14 1103 A      BOC      Z,$7
1358 0B15      $20:
1359 0B15 4C30 A      LI      R0,48;          DUPLICATE DEF ERROR
1360 0B16 2CAA I      JSR      ERROR          ;ERROR - DUPLICATE DEF
1361 0B17 24E5 I      JMP      NEXTLB
1362 0B18 2CE6 I      $7:      JSR      P2P1
1363 0B19 2107 A      JMP      SCK
1364 0B1A 805C B      LD      R0,LOCCTR
1365 0B1B A3FE A      ST      R0,-2(R3)
1366 0B1C 806B B      LD      R0,SECT
1367 0B1D C029 B      ADD      R0,K8          ;SET PDEF BIT
1368 0B1E C3FF A      ADD      R0,-1(R3)
1369 0B1F A3FF A      ST      R0,-1(R3)          ;SET RELOCATION
1370 0B20 24E5 I      JMP      NEXTLB          ;GO TO NEXT LABEL
1371 0B21      ;      CHECK LOCCTR ALIGNMENT
1372 0B21 83FF A      $CK:      LD      R0,-1(R3)
1373 0B22 C029 B      ADD      R0,K8
1374 0B23 A3FF A      ST      R0,-1(R3)
1375 0B24 83FE A      LD      R0,-2(R3)
1376 0B25 F05C B      SKNE    R0,LOCCTR
1377 0B26 24E5 I      JMP      NEXTLB
1378 0B27 21ED A      JMP      $20          ;MISALIN
1379 0B28      ;
1380 0B28      ;      ASSIGN DIRECTIVE
1381 0B28      ;
1382 0B28      ASSIGN:
1383 0B28 785E B      ISZ      INPTR          ;INPUT CHAR PTR
1384 0B29 292F A      JSR      PREPLB          ;PREP LABEL
1385 0B2A 24D7 I      JMP      DIREND
1386 0B2B AC8A B      ST      R3,LBLPT          ; SAVE LABEL PTR
1387 0B2C 2930 A      JSR      EXP
1388 0B2D 2125 A      JMP      $2          ; NO EXP - ERROR
1389 0B2E 8C8A B      LD      R3,LBLPT
1390 0B2F 83FF A      LD      R0,-1(R3)
1391 0B30 6029 B      AND      R0,K8
1392 0B31 150F A      BOC      NZ,$1
1393 0B32 807A B      LD      R0,EXPVAL          ;EXPRESSION VALUE
1394 0B33 A3FE A      ST      R0,-2(R3)          ; SET VALUE
1395 0B34 807C B      LD      R0,EXPREL          ;EXPRESSION RELOCATION MODE
1396 0B35 6027 B      AND      R0,K3
1397 0B36 111E A      BOC      Z,$3
1398 0B37 847B B      LD      R1,EXPPD
1399 0B38 5D03 A      SHL      R1,3
1400 0B39 3400 A      RADD     R1,R0
1401 0B3A 87FF A      LD      R1,-1(R3)
1402 0B3B 642E B      AND      R1,XFFF0          ;0FFF0
1403 0B3C 3400 A      RADD     R1,R0
1404 0B3D A3FF A      ST      R0,-1(R3)
1405 0B3E      $10:
1406 0B3E 807A B      LD      R0,EXPVAL          ;EXPRESSION VALUE
1407 0B3F      ;      OUTPUT VALUE AND RETURN
1408 0B3F 2CBE I      $5:      JSR      OVAL

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1409 0B40 24BA I      JMP      ENDST
1410 0B41          ;
1411 0B41 83FF A $1:   LD       R0,-1(R3)
1412 0B42 602C B      AND      R0,K4
1413 0B43 15FA A      BOC      NZ,$10
1414 0B44 4C30 A      LI       R0,48;          DUPLICATE DEF ERROR
1415 0B45 2CAA I      JSR      ERROR
1416 0B46 21F7 A      JMP      $10
1417 0B47          ;
1418 0B47          ;      DOT ASSIGN DIRECTIVE
1419 0B47          ;
1420 0B47          DOTASN:
1421 0B47 2CB3 I      JSR      IFBYP
1422 0B48 2914 A      JSR      EXP
1423 0B49 2109 A      JMP      $2          ;NO EXP ERROR
1424 0B4A 3280 A      RXCH     R0,R2
1425 0B4B 1109 A      BOC      Z,$3          ;NOT PREV DEF
1426 0B4C F46B B      SKNE     R1,SECT
1427 0B4D 2101 A      JMP      .+2
1428 0B4E 2108 A      JMP      $6
1429 0B4F A85C B      ST       R2,LOCCTR
1430 0B50 2CBC I      JSR      OOREC
1431 0B51 805C B      LD       R0,LOCCTR
1432 0B52 21EC A      JMP      $5
1433 0B53          ;
1434 0B53 4C00 A $2:   LI       R0,0;          MISSING ARG. ERROR      ;MISSING EXP E
1435 0B54 24E7 I      JMP      XERR1
1436 0B55 4C12 A $3:   LI       R0,18;          NOT PREV DEFINED ERROR      ;NOT PREV
1437 0B56 24E7 I      JMP      XERR1
1438 0B57 4C12 A $6:   LI       R0,18;          USAGE ERROR
1439 0B58 24E7 I      JMP      XERR1
1440 0B59          ;
1441 0B59          ;      PREPARE LABEL FOR ASSIGNMENT OF VALUE
1442 0B59          ;
1443 0B59          ;      JSR      PREPLB
1444 0B59          ;      NOT OK
1445 0B59          ;      OK -LBL READY
1446 0B59          ;
1447 0B59          PREPLB:
1448 0B59 2CB3 I      JSR      IFBYP
1449 0B5A 2CB7 I      JSR      STSER          ;SYMBOL TABLE SEARCH
1450 0B5B 0200 A      RTS          ;OVERFLOW
1451 0B5C 0201 A      RTS      1

1452 0B5D          .PAGE   'EXPRESSION CALC.'
1453 0B5D          .LOCAL
1454 0B5D          ;
1455 0B5D          ;      JSR EXP
1456 0B5D          ;      NO EXP RETURN (NOT AN ERROR) - EXPVAL=0
1457 0B5D          ;      NORMAL RETURN - R0=EXPVAL
1458 0B5D          ;      R2=EXPPD (PREV.DEF.)
1459 0B5D          ;
1460 0B5D 4C00 A EXP:  LI       R0,0
1461 0B5E A07A B      ST       R0,EXPVAL          ;EXPRESSION VALUE
1462 0B5F 4C01 A      LI       R0,1
1463 0B60 A07C B      ST       R0,EXPREL          ;EXPRESSION RELOCATION MODE ;SET ABS
1464 0B61 A07B B      ST       R0,EXPPD          ;PREV.DEF. 1=YES ;SET PREV. DEF. YES
1465 0B62 2C9F I      JSR      GITEM
1466 0B63 2106 A      JMP      $1          ;NO ITEM, PROBABLY AN OPERATOR
1467 0B64 F42C B      SKNE     R1,K4
1468 0B65 2101 A      JMP      .+2
1469 0B66 2125 A      JMP      $PLUS

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1470 0B67 A07A B      ST      R0,EXPVAL
1471 0B68 A47C B      ST      R1,EXPREL
1472 0B69 216D A      JMP      $FIN
1473 0B6A 2C9E I $1:   JSR      GNVC
1474 0B6B 216F A      JMP      $EX0           ;NO EXP
1475 0B6C F050 B      SKNE     R0,CPLUS
1476 0B6D 2101 A      JMP      .+2
1477 0B6E 2105 A      JMP      $1A
1478 0B6F 4C18 A      LI       R0,24;          ERROR SYNTAX
1479 0B70 2CAA I      JSR      ERROR
1480 0B71 21F8 A      JMP      $1
1481 0B72           $NXT:
1482 0B72 2C9E I      JSR      GNVC
1483 0B73 215D A      JMP      $EXPND           ;EXP. END
1484 0B74           ;
1485 0B74           $1A:
1486 0B74 A116 A      ST      R0,$OP
1487 0B75 F04F B      SKNE     R0,COMMA
1488 0B76 2159 A      JMP      $COM
1489 0B77 F043 B      SKNE     R0,RPAREN
1490 0B78 2157 A      JMP      $COM
1491 0B79 F046 B      SKNE     R0,LPAREN
1492 0B7A 2155 A      JMP      $COM
1493 0B7B           ;
1494 0B7B 2970 A      JSR      GITEM
1495 0B7C 212D A      JMP      $XERR
1496 0B7D 810D A      LD       R0,$OP
1497 0B7E           ;
1498 0B7E F050 B      SKNE     R0,CPLUS
1499 0B7F 210C A      JMP      $PLUS
1500 0B80 F051 B      SKNE     R0,CMINUS
1501 0B81 2117 A      JMP      $MINUS
1502 0B82 F03C B      SKNE     R0,CMPLY
1503 0B83 2137 A      JMP      $MPY
1504 0B84 F035 B      SKNE     R0,CDIV
1505 0B85 213B A      JMP      $DIV
1506 0B86 F053 B      SKNE     R0,CAND
1507 0B87 213F A      JMP      $AND
1508 0B88 F054 B      SKNE     R0,COR
1509 0B89 2142 A      JMP      $OR
1510 0B8A 2109 A      JMP      $EERR           ;EXP. ERROR
1511 0B8B 0B8C A $OP:  . = . + 1           ;TEMP SAVE OPERATOR
1512 0B8C           ;
1513 0B8C           ;
1514 0B8C           ; PLUS OPERATOR
1515 0B8C           ;
1516 0B8C 8486 B $PLUS: LD      R1,ITVAL
1517 0B8D C47A B      ADD      R1,EXPVAL       ;EXPRESSION VALUE
1518 0B8E 291E A      JSR      $PMREL         ;PLUS/MINUS REL.CALC.
1519 0B8F 2104 A      JMP      $EERR         ;1ST RETURN , BOTH T,B OR G RELOCATION
1520 0B90 A47C B      ST      R1,EXPREL       ;EXPRESSION RELOCATION MODE ;2ND RETURN
1521 0B91 F42C B      SKNE     R1,K4          ;EXTERNAL?
1522 0B92 2101 A      JMP      $EERR         ;YES
1523 0B93 21DE A      JMP      $NXT          ;GO TO NXT OPERATOR
1524 0B94 4C12 A $EERR: LI      R0,18;        EXP. -USAGE ERROR ;GLOBAL SYMBOL
1525 0B95 2CAA I $15: JSR      ERROR
1526 0B96 4C00 A      LI       R0,0
1527 0B97 A07C B      ST      R0,EXPREL       ;EXPRESSION RELOCATION MODE ;SET UNDEFI
1528 0B98 21D9 A      JMP      $NXT          ;CONTINUE TO NXT OPERATOR
1529 0B99           ;
1530 0B99           ; MINUS OPERATOR
1531 0B99           ;
1532 0B99 847A B $MINUS: LD      R1,EXPVAL       ;EXPRESSION VALUE

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1533 0B9A D486 B      SUB      R1,ITVAL
1534 0B9B 2911 A      JSR      $PMREL      ;PLUS/MINUS RL.CALC.
1535 0B9C 2106 A      JMP      $13          ;RET 1- BOTH T,B OR G RELOCATION
1536 0B9D F087 B      SKNE     R0,ITREL     ;RET 2- LOWEST IS ABS.
1537 0B9E 2101 A      JMP      $14          ;      ARG2 IS ABS
1538 0B9F      ;      ARG 1 IS ABS,ARG2 GR THAN ABS (1)
1539 0B9F 21F4 A      JMP      $EERR
1540 0BA0 F42C B $14:  SKNE     R1,K4
1541 0BA1 21F2 A      JMP      $EERR      ;GLOBAL USAGE ERROR
1542 0BA2 21CF A      JMP      $NXT      ;NEXT OPERATOR
1543 0BA3      ;      BOTH ARGS HAVE T,B OR G RELOCATION
1544 0BA3 F42C B $13:  SKNE     R1,K4
1545 0BA4 21EF A      JMP      $EERR      ;GLOBAL ERROR
1546 0BA5 3482 A      RXOR     R1,R0
1547 0BA6 15ED A      BOC      NZ,$EERR     ;NOT SAME - ERROR
1548 0BA7      ;      SAME - SAME REL = ABS
1549 0BA7 4C01 A      LI       R0,1
1550 0BA8 A07C B      ST       R0,EXPREL     ;EXPRESSION RELOCATION MODE
1551 0BA9 21C8 A      JMP      $NXT      ;NEXT OPERATOR
1552 0BAA 4C18 A $XERR: LI       R0,24;      SYNTAX ERROR
1553 0BAB 2CAA I      JSR      ERROR
1554 0BAC 2124 A      JMP      $EXPND
1555 0BAD      ;
1556 0BAD      ;      SPECIAL SUBR. USED TO HELP WITH REL.CALC. FOR PLUS/MINUS
1557 0BAD      ;
1558 0BAD A47A B $PMREL: ST      R1,EXPVAL     ;EXPRESSION VALUE ;STORE VALUE RESULT
1559 0BAE 8087 B      LD       R0,ITREL
1560 0BAF 847C B      LD       R1,EXPREL     ;EXPRESSION RELOCATION MODE
1561 0BB0 E487 B      SKG      R1,ITREL
1562 0BB1 3180 A      RXCH     R0,R1
1563 0BB2      ;      R0 LESS OR EQUAL TO R1 NOW
1564 0BB2 1105 A      BOC      Z,$11          ;UNDEF INHERIT
1565 0BB3 F426 B      SKNE     R1,K1
1566 0BB4 2104 A      JMP      $12          ;BOTH ABS
1567 0BB5 F026 B      SKNE     R0,K1
1568 0BB6 0201 A      RTS      1          ;LOW I ABS,OTHER?
1569 0BB7 0200 A      RTS          ;LOW IS GR THAN ABS (1)
1570 0BB8      ;      UNDEFINED
1571 0BB8 A07C B $11:  ST       R0,EXPREL     ;EXPRESSION RELOCATION MODE
1572 0BB9      ;      FINISHED BUT MUST POP RET. FROM STACK, THEN GO TO NXT OPERATOR
1573 0BB9 4400 A $12:  PULL     R0
1574 0BBA 21B7 A      JMP      $NXT
1575 0BBB      ;
1576 0BBB      ;
1577 0BBB      ;
1578 0BBB 2923 A $MPY:  JSR      $REL
1579 0BBC 807A B      LD       R0,EXPVAL     ;EXPRESSION VALUE
1580 0BBD 8486 B      LD       R1,ITVAL
1581 0BBE 2C0D B      JSR      @MULT
1582 0BBF A47A B $MPY1: ST      R1,EXPVAL     ;EXPRESSION VALUE
1583 0BC0 21B1 A      JMP      $NXT
1584 0BC1      ;
1585 0BC1 291D A $DIV:  JSR      $REL
1586 0BC2 4C00 A      LI       R0,0
1587 0BC3 847A B      LD       R1,EXPVAL     ;EXPRESSION VALUE
1588 0BC4 8C86 B      LD       R3,ITVAL
1589 0BC5 2C0E B      JSR      @DIVD
1590 0BC6 21F8 A      JMP      $MPY1
1591 0BC7      ;
1592 0BC7      ;      AND OPERATOR
1593 0BC7      ;
1594 0BC7 2917 A $AND:  JSR      $REL
1595 0BC8 807A B      LD       R0,EXPVAL     ;EXPRESSION VALUE

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1596 0BC9 6086 B      AND      R0,ITVAL
1597 0BCA A07A B $20:  ST      R0,EXPVAL      ;EXPRESSION VALUE
1598 0BCB 21A6 A      JMP      $NXT
1599 0BCC      ;
1600 0BCC      ;      OR OPERATOR
1601 0BCC      ;
1602 0BCC 2912 A $OR:  JSR      $REL
1603 0BCD 807A B      LD      R0,EXPVAL      ;EXPRESSION VALUE
1604 0BCE 6886 B      OR      R0,ITVAL
1605 0BCF 21FA A      JMP      $20
1606 0BD0      ;
1607 0BD0      ;      EXPRESSION END
1608 0BD0      ;
1609 0BD0 7C5E B $COM:  DSZ      INPTR      ;INPUT CHAR PTR
1610 0BD1      $EXPND:
1611 0BD1      ;      DIAGNOSE IF PASS 2 AND UNDEFINED
1612 0BD1 2CE8 I      JSR      P1P2
1613 0BD2 2104 A      JMP      $FIN
1614 0BD3 807C B      LD      R0,EXPREL      ;EXPRESSION RELOCATION MODE
1615 0BD4 1502 A      BOC      NZ,$FIN
1616 0BD5 4C2A A      LI      R0,42;      UNDEFINED ERROR
1617 0BD6 2CAA I      JSR      ERROR
1618 0BD7 807A B $FIN:  LD      R0,EXPVAL      ;EXPRESSION VALUE
1619 0BD8 887B B      LD      R2,EXPPD      ;PREV.DEF. 1=YES ;PREV. DEF. CODE
1620 0BD9 847C B      LD      R1,EXPREL      ;EXPRESSION RELOCATION MODE
1621 0BDA 0201 A      RTS      1
1622 0BDB      ;
1623 0BDB 807A B $EX0:  LD      R0,EXPVAL      ;EXPRESSION VALUE
1624 0BDC 887B B      LD      R2,EXPPD      ;PREV.DEF. 1=YES
1625 0BDD 847C B      LD      R1,EXPREL      ;EXPRESSION RELOCATION MODE
1626 0BDE 0200 A      RTS      0
1627 0BDF      ;
1628 0BDF      ;      CALC. REL. FOR AND,OR,MPY,DIV
1629 0BDF      ;
1630 0BDF 8087 B $REL:  LD      R0,ITREL
1631 0BE0 847C B      LD      R1,EXPREL      ;EXPRESSION RELOCATION MODE
1632 0BE1 E487 B      SKG      R1,ITREL
1633 0BE2 3180 A      RXCH     R0,R1
1634 0BE3 E426 B      SKG      R1,K1
1635 0BE4 2105 A      JMP      $30
1636 0BE5 4C00 A      LI      R0,0
1637 0BE6 A07C B      ST      R0,EXPREL      ;EXPRESSION RELOCATION MODE
1638 0BE7 A07A B      ST      R0,EXPVAL      ;EXPRESSION VALUE
1639 0BE8 4400 A      PULL     R0
1640 0BE9 21AA A      JMP      $EERR      ;REL. ERROR IN EXP.
1641 0BEA A07C B $30:  ST      R0,EXPREL      ;EXPRESSION RELOCATION MODE
1642 0BEB 0200 A      RTS

1643 0BEC      .PAGE   ' GET ITEM '
1644 0BEC      .LOCAL
1645 0BEC      ;
1646 0BEC      ;      JSR      GITEM
1647 0BEC      ;      NONE (NOT AN ERROR) ITVAL=0   ITREL=1 (ABS)
1648 0BEC      ;      NORMAL RET
1649 0BEC      ;      SET ITVAL,ITREL (IF GR 4, AND WITH 3)
1650 0BEC      ;      . REFERS TO LOCCTR
1651 0BEC      ;      ALLOW UNARY OPS
1652 0BEC      ;
1653 0BEC      ;
1654 0BEC      ;
1655 0BEC 4C00 A GITEM:  LI      R0,0
1656 0BED A096 B      ST      R0,ITVAL

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1657 0BEE A130 A      ST      R0,$UOP
1658 0BEF 4C01 A      LI      R0,1
1659 0BF0 A087 B      ST      R0,ITREL
1660 0BF1 2C9E I      JSR      GNVC
1661 0BF2 0200 A      RTS                      ;NO ITEM RETURN
1662 0BF3          ;
1663 0BF3          ;      TEST LEADING CHAR.
1664 0BF3          ;
1665 0BF3 F04A B $TEST: SKNE     R0,DOT
1666 0BF4 216C A      JMP      $DOT
1667 0BF5 F038 B      SKNE     R0,CZERO
1668 0BF6 2111 A      JMP      $HEX
1669 0BF7 F045 B      SKNE     R0,QUOTE
1670 0BF8 2140 A      JMP      $QUOTE
1671 0BF9 F04F B      SKNE     R0,COMMA
1672 0BFA 2125 A      JMP      $100
1673 0BFB F052 B      SKNE     R0,CNOT
1674 0BFC 2133 A      JMP      $NOT
1675 0BFD F051 B      SKNE     R0,CMINUS
1676 0BFE 2133 A      JMP      $MINUS
1677 0BFF F044 B      SKNE     R0,CHARX
1678 0C00 214B A      JMP      $X
1679 0C01 F04E B      SKNE     R0,DOLLAR
1680 0C02 214E A      JMP      $NAME
1681 0C03 E035 B      SKG      R0,HEX2F
1682 0C04 2167 A      JMP      $BS0          ;BACKSPACE AND RETURN 0
1683 0C05 E036 B      SKG      R0,HEX39
1684 0C06 2136 A      JMP      $DEC
1685 0C07 2149 A      JMP      $NAME          ;ALPHA - TRY NAME
1686 0C08          ;
1687 0C08          ;
1688 0C08          ;      ZERO - HEX CONSTANT
1689 0C08          ;
1690 0C08 2CE9 I $HEX: JSR      GNCVC
1691 0C09 2109 A      JMP      $RET1          ;FINISHED CONSTANT-GO PROCESS UNARY OP
1692 0C0A E035 B      SKG      R0,HEX2F
1693 0C0B 2106 A      JMP      $BSPR1        ;BACKSPACE AND RETURN 1
1694 0C0C E036 B      SKG      R0,HEX39
1695 0C0D 2115 A      JMP      $1
1696 0C0E E032 B      SKG      R0,HEX40      ;A -1
1697 0C0F 2102 A      JMP      $BSPR1
1698 0C10 E037 B      SKG      R0,HEX46      ;F
1699 0C11 2113 A      JMP      $2
1700 0C12          ;      BACKSPACE
1701 0C12 7C5E B $BSPR1: DSZ      INPTR          ;INPUT CHAR PTR
1702 0C13          ;
1703 0C13          ;      RETURN VALUE AFTER PROCESSING UNARY OPS WHICH WERE SAVED
1704 0C13          ;
1705 0C13 8486 B $RET1: LD      R1,ITVAL
1706 0C14 810A A      LD      R0,$UOP
1707 0C15 1103 A      BOC      Z,$NOUN          ;NO UNARY
1708 0C16 1305 A      BOC      ODD,$UM          ;UNARY MINUS
1709 0C17 5100 A $UNOT: CAI      R1,0
1710 0C18 A486 B $30:  ST      R1,ITVAL
1711 0C19 8086 B $NOUN: LD      R0,ITVAL
1712 0C1A 8487 B      LD      R1,ITREL
1713 0C1B 0201 A      RTS      1
1714 0C1C 5101 A $UM:  CAI      R1,1
1715 0C1D 14F9 A      BOC      BLEQ1,$UNOT
1716 0C1E 21F9 A      JMP      $30
1717 0C1F 0000 A $UOP: .WORD    0          ;UNARY OP CODE   BIT 0 MIN,BIT 1 NOT
1718 0C20 4C18 A $100: LI      R0,24;          SYNTAX ERROR
1719 0C21 2CAA I      JSR      ERROR

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1720 0C22 21EF A      JMP      $BSPR1
1721 0C23              ;
1722 0C23              ;      CONTINUE HEX
1723 0C23              ;
1724 0C23 D038 B $1:   SUB      R0,HEX30
1725 0C24 2101 A      JMP      $3
1726 0C25 D039 B $2:   SUB      R0,HEX37
1727 0C26 8486 B $3:   LD       R1,ITVAL
1728 0C27 7546 A      SKAZ     R1,XF000
1729 0C28 2104 A      JMP      $4
1730 0C29 5D04 A      SHL      R1,4
1731 0C2A 3400 A      RADD     R1,R0
1732 0C2B A086 B      ST       R0,ITVAL
1733 0C2C 21DB A      JMP      $HEX
1734 0C2D 4C06 A $4:   LI       R0,6;      ;LOOP BACK FOR NEXT HEX DIGIT
1735 0C2E 2CAA I      JSR      ERROR      VALUE ERROR
1736 0C2F 21E3 A      JMP      $RET1
1737 0C30              ;
1738 0C30              ;      % - NOT
1739 0C30              ;
1740 0C30 4D02 A $NOT:  LI       R1,2
1741 0C31 2101 A      JMP      $MIN1
1742 0C32              ;
1743 0C32              ;      - MINUS
1744 0C32              ;
1745 0C32              ;$MINUS:
1746 0C32 4D01 A      LI       R1,1
1747 0C33 81EB A $MIN1: LD       R0,$UOP
1748 0C34 3482 A      RXOR     R1,R0
1749 0C35 A1E9 A      ST       R0,$UOP
1750 0C36 2C9E I      JSR      GNVC
1751 0C37 2131 A      JMP      $ERR
1752 0C38 21BA A      JMP      $TEST
1753 0C39              ;
1754 0C39              ;      QUOTE - STRING CONSTANT
1755 0C39 2CEA I $QUOTE: JSR      GSTCON
1756 0C3A 212E A      JMP      $ERR
1757 0C3B A086 B      ST       R0,ITVAL
1758 0C3C 21D6 A      JMP      $RET1
1759 0C3D              ;
1760 0C3D              ;      NON-ZERO DIGIT
1761 0C3D D038 B $DEC:  SUB      R0,HEX30
1762 0C3E              ;      MPY ITVAL BY 10 AND ADD DIGIT FROM R0
1763 0C3E 8486 B      LD       R1,ITVAL
1764 0C3F 5D01 A      SHL      R1,1
1765 0C40 A486 B      ST       R1,ITVAL
1766 0C41 5D02 A      SHL      R1,2
1767 0C42 C486 B      ADD      R1,ITVAL
1768 0C43 3400 A      RADD     R1,R0
1769 0C44 A086 B      ST       R0,ITVAL
1770 0C45 2CE9 I      JSR      GNCVC
1771 0C46 21CC A      JMP      $RET1
1772 0C47 E035 B      SKG      R0,HEX2F
1773 0C48 21C9 A      JMP      $BSPR1
1774 0C49 E036 B      SKG      R0,HEX39
1775 0C4A 21F2 A      JMP      $DEC
1776 0C4B 21C6 A      JMP      $BSPR1
1777 0C4C              ;
1778 0C4C              ;      X - HEX OR NAME
1779 0C4C 2CE9 I $X:   JSR      GNCVC
1780 0C4D 2103 A      JMP      $NAME
1781 0C4E F045 B      SKNE     R0,QUOTE
1782 0C4F 21B8 A      JMP      $HEX

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;GET NEXT VALID CHAR.
;NO MORE
;BACKSPACE AND RETURN 1
;NONE - NAME IS X
; X'

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1783 0C50 7C5E B      DSZ      INPTR      ;INPUT CHAR PTR
1784 0C51           ;
1785 0C51           ;      NAME
1786 0C51 7C5E B $NAME: DSZ      INPTR      ;INPUT CHAR PTR
1787 0C52 291C A      JSR      GSYM      ;GET SYMBOL
1788 0C53 2115 A      JMP      $ERR      ;NOT A VALID NAME
1789 0C54 8082 B      LD      R0,STVAL
1790 0C55 A086 B      ST      R0,ITVAL
1791 0C56 8083 B      LD      R0,STPDEF
1792 0C57 607B B      AND      R0,EXPPD   ;PREV.DEF. 1=YES
1793 0C58 A07B B      ST      R0,EXPPD   ;PREV.DEF. 1=YES
1794 0C59 8300 A      LD      R0,0(R3)
1795 0C5A 682C B      OR      R0,K4
1796 0C5B A300 A      ST      R0,0(R3)   ;SET USED BIT
1797 0C5C 8084 B      LD      R0,STREL
1798 0C5D E02C B      SKG      R0,K4
1799 0C5E 2105 A      JMP      $SYRET    ;SYMBL RETURN
1800 0C5F 6027 B      AND      R0,K3
1801 0C60 2103 A      JMP      $SYRET
1802 0C61           ;
1803 0C61           ;      . USE LOCCTR
1804 0C61 845C B $DOT: LD      R1,LOCCTR
1805 0C62 806B B      LD      R0,SECT
1806 0C63 A486 B      ST      R1,ITVAL
1807 0C64 A087 B $SYRET: ST      R0,ITREL
1808 0C65 F026 B      SKNE     R0,K1
1809 0C66 21AC A      JMP      $RET1     ;ABS - PROCESS UNARY OPS IF THERE WERE
1810 0C67 81B7 A      LD      R0,$UOP
1811 0C68 11B0 A      BOC      Z,$NOUN
1812 0C69           ;
1813 0C69           ;
1814 0C69 4C18 A $ERR:  LI      R0,24;      SYNTAX ERROR      ; SYNTAX      ERROR
1815 0C6A 2CAA I      JSR      ERROR
1816 0C6B 0200 A      RTS      0
1817 0C6C           ;
1818 0C6C 7C5E B $BS0:  DSZ      INPTR      ;INPUT CHAR PTR
1819 0C6D 0200 A      RTS      0
1820 0C6E F000 A XF000: .WORD    0F000

1821 0C6F           .PAGE    'GET SYMBOL ,BUILD NAME/DIR'
1822 0C6F           .LOCAL
1823 0C6F           ;      GET SYMBOL(IF ANY)
1824 0C6F           ;      SCANS NAME,SEARCHES SYMBOL TABLE,R0=STVAL,R1=STREL
1825 0C6F           ;      R3=STPT
1826 0C6F           ;
1827 0C6F           ;      JSR      GSYM
1828 0C6F           ;      NO SYMBOL RETURN
1829 0C6F           ;      NORMAL RETURN
1830 0C6F 4C00 A GSYM:  LI      R0,0
1831 0C70 2101 A      JMP      $GS2
1832 0C71           ;
1833 0C71 4C02 A GFORM: LI      R0,2
1834 0C72 A10E A $GS2: ST      R0,$SORF   ;SYMBOL3OR3FORM
1835 0C73 2C9E I      JSR      GNVC
1836 0C74 0200 A      RTS           ;NO SYMBOL RETURN
1837 0C75 290C A      JSR      BLDNAM    ;BUILD NAME
1838 0C76 0200 A      RTS           ;NO NAME RETURN
1839 0C77 8109 A      LD      R0,$SORF
1840 0C78 C080 B      ADD      R0,CNAM0   ;1ST 2 COMPRESSED CHARS. OF NAME
1841 0C79 A080 B      ST      R0,CNAM0   ;1ST 2 COMPRESSED CHARS. OF NAME
1842 0C7A 2963 A      JSR      STSER
1843 0C7B 24EB I      JMP      INABS-1    ;SEARCH SYMBOL TABLE

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1844 0C7C 8082 B      LD      R0,STVAL      ;VALUE
1845 0C7D 8484 B      LD      R1,STREL      ;RELOCATION CODE
1846 0C7E 0201 A      RTS          1
1847 0C7F 4400 A $GS1: PULL      R0
1848 0C80 24BA I      JMP      ENDST      ;STATEMENT END
1849 0C81 0C82 A $SORF: .+.1
1850 0C82          ;
1851 0C82          ;      BUILD NAME OR DIRECTIVE
1852 0C82          ;
1853 0C82          ;      JSR      BLDNAM OR BLDDIR
1854 0C82          ;      NO NAME RETURN
1855 0C82          ;      NORML RETURN
1856 0C82          ;
1857 0C82          ;      ENTRY: R0 CONTAINS 1ST CHAR
1858 0C82          ;      EXIT:  R0 CONTAINS NEXT VALID CHAR (BUT NOT SKIPPE
1859 0C82          ;      $ REPLACED WITH REGION NUM.
1860 0C82          ;      SET NAM0,NAM1,NAM2,CNAM0,CNAM1
1861 0C82          ;
1862 0C82 F04E B BLDNAM: SKNE      R0,DOLLAR
1863 0C83 2105 A      JMP      $1          ;$ OK
1864 0C84 E032 B      SKG      R0,HEX40      ;A -1
1865 0C85 0200 A      RTS          ;NOT A VALID NAME
1866 0C86 E033 B      SKG      R0,HEX5A      ;Z
1867 0C87 2108 A      JMP      $2
1868 0C88 0200 A      RTS          ;NOT A VALID NAME
1869 0C89          ;      BUILD LOCAL NAME
1870 0C89 4D08 A $1:  LI      R1,8
1871 0C8A A480 B      ST      R1,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME;SET LO
1872 0C8B 806C B      LD      R0,LOCREG
1873 0C8C 5C08 A      SHL      R0,8
1874 0C8D 3181 A      RCPY     R0,R1
1875 0C8E 5D02 A      SHL      R1,2
1876 0C8F 2103 A      JMP      $3
1877 0C90
1878 0C90          ;      BUILD NON LOCAL NAME
1879 0C90          ;      BLDDIR:
1880 0C90 4D00 A $2:  LI      R1,0
1881 0C91 A480 B      ST      R1,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME
1882 0C92 2933 A      JSR      $GL1
1883 0C93 2929 A $3:  JSR      $GP1
1884 0C94 A07D B      ST      R0,NAM0      ;1ST 2 CHARACTERS OF NAME ;STORE 1ST
1885 0C95 C480 B      ADD      R1,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME;PICK U
1886 0C96 A480 B      ST      R1,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME
1887 0C97          ;
1888 0C97 2924 A      JSR      $GP
1889 0C98 A07E B      ST      R0,NAM1      ;3RD AND 4TH CHARACTERS OF NAME ;STORE
1890 0C99 A481 B      ST      R1,CNAM1      ;COMPRESSED 3RD AND 4TH CHARS.COMPRESSE
1891 0C9A 2921 A      JSR      $GP
1892 0C9B A07F B      ST      R0,NAM2      ;5TH AND 6TH CHARACTERS OF NAME ;STORE
1893 0C9C F048 B      SKNE     R0,BLANKS
1894 0C9D 210F A      JMP      $4
1895 0C9E          ;      SET LONG SYMBOL FLAGS
1896 0C9E 8030 B      LD      R0,X8000
1897 0C9F C07D B      ADD      R0,NAM0      ;1ST 2 CHARACTERS OF NAME
1898 0CA0 A07D B      ST      R0,NAM0      ;1ST 2 CHARACTERS OF NAME
1899 0CA1 4C01 A      LI      R0,1
1900 0CA2 C080 B      ADD      R0,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME
1901 0CA3 A080 B      ST      R0,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME
1902 0CA4          ;      TEST IF LOCAL LONG SYMBOL
1903 0CA4 4C08 A      LI      R0,8
1904 0CA5 7080 B      SKAZ     R0,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME
1905 0CA6 2101 A      JMP      .+2
1906 0CA7 2105 A      JMP      $4

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1907 0CA8      ; YES-FORCE BLANK IN 6TH CHAR OF LOCAL SYMBOL
1908 0CA8 807F B LD      R0,NAM2      ;5TH AND 6TH CHARACTERS OF NAME
1909 0CA9 5CF8 A SHR      R0,8
1910 0CAA 5C08 A SHL      R0,8
1911 0CAB C034 B ADD      R0,BLANK
1912 0CAC A07F B ST      R0,NAM2      ;5TH AND 6TH CHARACTERS OF NAME
1913 0CAD 807D B $4: LD      R0,NAM0      ;1ST 2 CHARACTERS OF NAME ;TEST IF NA
1914 0CAE F10B A SKNE     R0,$DT      ; .
1915 0CAF 24D9 I JMP      XERROR
1916 0CB0 F10A A SKNE     R0,$DL      ; $
1917 0CB1 24D9 I JMP      XERROR
1918 0CB2      ; SKIP EXCESS CHARS. IN NAME IF ANY
1919 0CB2 291D A $4B: JSR     $GAN
1920 0CB3 F034 B SKNE     R0,BLANK
1921 0CB4 2101 A JMP      $4A
1922 0CB5 21FC A JMP      $4B
1923 0CB6 2C9E I $4A: JSR     GNVC
1924 0CB7 0201 A RTS      1
1925 0CB8 7C5E B DSZ      INPTR      ;INPUT CHAR PTR
1926 0CB9 0201 A RTS      1
1927 0CBA 2E20 A $DT: .WORD  '.'
1928 0CBB 2420 A $DL: .WORD  '$'
1929 0CBC      ;
1930 0CBC      ; GET PAIR OF CHAR
1931 0CBC      ;
1932 0CBC 2908 A $GP: JSR     $GL
1933 0CBD A105 A $GP1: ST      R0,$T0
1934 0CBE A505 A ST      R1,$T1
1935 0CBF 290B A JSR     $GR
1936 0CC0 C102 A ADD      R0,$T0
1937 0CC1 C502 A ADD      R1,$T1
1938 0CC2 0200 A RTS
1939 0CC3      ;
1940 0CC3 0000 A $T0: .WORD  0      ; TEMP0
1941 0CC4 0000 A $T1: .WORD  0      ; TEMP1
1942 0CC5      ;
1943 0CC5      ; GET LEFT CHAR
1944 0CC5      ;
1945 0CC5 290A A $GL: JSR     $GAN
1946 0CC6 3181 A $GL1: RCPY    R0,R1
1947 0CC7 D434 B SUB      R1,HEX20
1948 0CC8 5C08 A SHL      R0,8
1949 0CC9 5D0A A SHL      R1,10
1950 0CCA 0200 A RTS
1951 0CCB      ;
1952 0CCB      ; GET RIGH CHAR
1953 0CCB      ;
1954 0CCB 2904 A $GR: JSR     $GAN
1955 0CCC 3181 A RCPY    R0,R1
1956 0CCD D434 B SUB      R1,HEX20
1957 0CCE 5D04 A SHL      R1,4
1958 0CCF 0200 A RTS
1959 0CD0      ;
1960 0CD0      ; GET NEXT CONSECUTIVE CHAR IF ALPHA/NUM ELSE BLANK
1961 0CD0      ;
1962 0CD0 2CEC I $GAN: JSR     GNC      ;NEXT CHAR
1963 0CD1 2107 A JMP      $11      ;NONE
1964 0CD2 E035 B SKG      R0,HEX2F      ;0 -1
1965 0CD3 2104 A JMP      $10      ;NOT A/N
1966 0CD4 E032 B SKG      R0,HEX40
1967 0CD5 2105 A JMP      $12      ;MAY BE NUMERIC
1968 0CD6 E033 B SKG      R0,HEX5A      ;Z
1969 0CD7 0200 A RTS      ;CHAR I A/N

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1970 0CD8 7C5E B $10: DSZ INPTR ;INPUT CHAR PTR ;NOT A/N - BACKSPACE
1971 0CD9 8034 B $11: LD R0,BLANK
1972 0CDA 0200 A RTS
1973 0CDB E036 B $12: SKG R0,HEX39 ;9
1974 0CDC 0200 A RTS ;RETURN WITH A/N
1975 0CDD 21FA A JMP $10

1976 0CDE .PAGE 'STSER - SYMBOL TABLE SEARCH'
1977 0CDE .LOCAL
1978 0CDE ;
1979 0CDE ; SYMBOL TABLE SEARCH
1980 0CDE ;
1981 0CDE ; JSR STSER
1982 0CDE ; OVERFLOW RETURN
1983 0CDE ; NORMAL RETURN (R3 PTS. TO ENTRY)
1984 0CDE ;
1985 0CDE ; WILL APPEND NEW ENTRY IF NOT FOUND
1986 0CDE ;
1987 0CDE STSER:
1988 0CDE ;
1989 0CDE ; SET REGION A
1990 0CDE 8065 B LD R0,NEXTA
1991 0CDF A062 B ST R0,NEXT
1992 0CE0 8064 B LD R0,TOPA
1993 0CE1 A061 B ST R0,TOP
1994 0CE2 8063 B LD R0,BASEA
1995 0CE3 A060 B ST R0,BASE
1996 0CE4 8152 A LD R0,$NXTA
1997 0CE5 ;
1998 0CE5 ; REGION SEARCH
1999 0CE5 ;
2000 0CE5 8C61 B $RSER: LD R3,TOP
2001 0CE6 A152 A ST R0,$QNXT
2002 0CE7 2108 A JMP $4
2003 0CE8 ; TOP OF LOOP
2004 0CE8 8300 A $1: LD R0,0(R3)
2005 0CE9 6150 A AND R0,XXXXFB
2006 0CEA F080 B SKNE R0,CNAM0 ;1ST 2 COMPRESSED CHARS. OF NAME
2007 0CEB 2110 A JMP $2 ;WORD 0 MATCH
2008 0CEC ; NO MATCH-LOOP
2009 0CEC 8300 A $3: LD R0,0(R3)
2010 0CED 6027 B AND R0,K3
2011 0CEE 50FE A CAI R0,-2
2012 0CEF 3300 A RADD R0,R3
2013 0CF0 FC62 B $4: SKNE R3,NEXT
2014 0CF1 2137 A JMP $REND ;REGION END
2015 0CF2 21F5 A JMP $1 ;NEXT ENTRY LOOP
2016 0CF3 ; APPEND ENRY IF ROOM
2017 0CF3 $APEND:
2018 0CF3 8080 B $APPEND: LD R0,CNAM0 ;1ST 2 COMPRESSED CHARS. OF NAME
2019 0CF4 6027 B AND R0,K3
2020 0CF5 50FE A CAI R0,-2
2021 0CF6 C062 B ADD R0,NEXT
2022 0CF7 E060 B SKG R0,BASE
2023 0CF8 212A A JMP $ROV ;REGION OVERFLOW
2024 0CF9 ; YES - ROOM AVAIL. - APPEND ENTRY
2025 0CF9 A062 B ST R0,NEXT
2026 0CFA B13E A ST R0,$QNXT
2027 0CFB 4801 A AISZ R0,1
2028 0CFC A074 B ST R0,FORMPT
2029 0CFD 8080 B LD R0,CNAM0 ;1ST 2 COMPRESSED CHARS. OF NAME
2030 0CFE A300 A ST R0,0(R3)

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2031 0CFF 8481 B      LD      R1,CNAM1          ;COMPRESSED 3RD AND 4TH CHARS.
2032 0D00 A7FF A      ST      R1,-1(R3)
2033 0D01 4D00 A      LI      R1,0
2034 0D02 A7FE A      ST      R1,-2(R3)
2035 0D03 1301 A      BOC     ODD,$6          ;LONG SYMBOL
2036 0D04 2102 A      JMP     $7
2037 0D05          ;      NEW ENTRY TO CONTAIN LONG SYMBOL
2038 0D05 847F B $6:   LD      R1,NAM2          ;5TH AND 6TH CHARACTERS OF NAME
2039 0D06 A7FD A      ST      R1,-3(R3)
2040 0D07 AC85 B $7:   ST      R3,STPT
2041 0D08 2106 A      JMP     $9          ;SET UP RESULTS AND RETURN
2042 0D09          ;      WORD0 MATCH CHECK OTHERS
2043 0D09 87FF A $2:   LD      R1,-1(R3)
2044 0D0A 642E B      AND     R1,XFFF0          ;FFF0 INCLUDES LOCAL BIT
2045 0D0B F481 B      SKNE    R1,CNAM1          ;COMPRESSED 3RD AND 4TH CHARS.
2046 0D0C 2101 A      JMP     $2A
2047 0D0D 21DE A      JMP     $3          ;NO MATCH
2048 0D0E 1310 A $2A:  BOC     ODD,$8          ;CHECK 3RD WORD
2049 0D0F          ;      MATCH GOOD - SET RESULTS AND RETURN
2050 0D0F 8300 A $9:   LD      R0,0(R3)
2051 0D10 6027 B      AND     R0,K3
2052 0D11 50FF A      CAI     R0,-1
2053 0D12 3C00 A      RADD    R3,R0
2054 0D13 A074 B      ST      R0,FORMPT
2055 0D14 83FF A      LD      R0,-1(R3)
2056 0D15 5CFD A      SHR     R0,3
2057 0D16 6026 B      AND     R0,K1
2058 0D17 A083 B      ST      R0,STPDEF
2059 0D18 83FF A      LD      R0,-1(R3)
2060 0D19 602A B      AND     R0,K7
2061 0D1A A084 B      ST      R0,STREL
2062 0D1B 83FE A      LD      R0,-2(R3)
2063 0D1C A082 B      ST      R0,STVAL
2064 0D1D AC85 B      ST      R3,STPT
2065 0D1E 0201 A      RTS      1
2066 0D1F          ;
2067 0D1F          ;      CHECK MATCH OF 3RD WORD
2068 0D1F 87FD A $8:   LD      R1,-3(R3)
2069 0D20 F47F B      SKNE    R1,NAM2          ;5TH AND 6TH CHARACTERS OF NAME
2070 0D21 21ED A      JMP     $9          ; MATCH
2071 0D22 21C9 A      JMP     $3          ;NO MATCH - LOOP
2072 0D23          ;
2073 0D23          ;      REGION OVERFLOW
2074 0D23          ;
2075 0D23 8060 B $ROV: LD      R0,BASE
2076 0D24 F066 B      SKNE    R0,BASEB          ;IS THIS LAST REGION?
2077 0D25 2101 A      JMP     $10
2078 0D26 2108 A      JMP     $SETB
2079 0D27          ;      YES- SYMBOL TABLE OVERFLOW
2080 0D27 4C24 A $10:  LI      R0,36;          TABLE OVERFLOW ERROR
2081 0D28 24AA I      JMP     ERROR          ;ALSO RETURN TO MY CALLER
2082 0D29          ;
2083 0D29          ;      REGION END
2084 0D29          ;
2085 0D29 8060 B $REND: LD      R0,BASE
2086 0D2A F066 B      SKNE    R0,BASEB          ;IS THIS LAST REGION?
2087 0D2B 21C7 A      JMP     $APEND          ;YES
2088 0D2C          ;      MAYBE IN 2ND REGION UNLESS EMPTY
2089 0D2C 8068 B      LD      R0,NEXTB
2090 0D2D F067 B      SKNE    R0,TOPB          ;IS REGION B EMPTY
2091 0D2E 21C4 A      JMP     $APEND          ;YES
2092 0D2F          ;
2093 0D2F          ;      SET UP REGION B

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2094 0D2F      ;
2095 0D2F 8068 B $SETB: LD      R0,NEXTB
2096 0D30 A062 B      ST      R0,NEXT
2097 0D31 8066 B      LD      R0,BASEB
2098 0D32 A060 B      ST      R0,BASE
2099 0D33 8067 B      LD      R0,TOPB
2100 0D34 A061 B      ST      R0,TOP
2101 0D35 8102 A      LD      R0,$NXTB
2102 0D36 21AE A      JMP      $RSER      ;REGION SEARCH
2103 0D37 0065 B $NXTA: .WORD  NEXTA
2104 0D38 0068 B $NXTB: .WORD  NEXTB
2105 0D39 0D3A A $QNXT: .=.+1
2106 0D3A FFFB A XFFFB: .WORD  0FFFFB
2107 0D3B      .PAGE
2108 0D3B      .LOCAL
2109 0D3B      ;
2110 0D3B      ; DIRECTIVE / INSTRUCTION SEARCH
2111 0D3B      ;
2112 0D3B      DISER:
2113 0D3B 8D15 A      LD      R3,DITBLF
2114 0D3C 847E B      LD      R1,NAM1      ;3RD AND 4TH CHARACTERS OF NAME
2115 0D3D 887F B      LD      R2,NAM2      ;5TH AND 6TH CHARACTERS OF NAME
2116 0D3E      ; BEGIN LOOP
2117 0D3E 807D B $2:  LD      R0,NAM0      ;1ST 2 CHARACTERS OF NAME 1ST 2 CHARA
2118 0D3F F302 A      SKNE     R0,2(R3)
2119 0D40 2101 A      JMP      .+2
2120 0D41 2107 A      JMP      $3
2121 0D42 F703 A      SKNE     R1,3(R3)
2122 0D43 2101 A      JMP      $2B
2123 0D44 2105 A      JMP      $4
2124 0D45 1201 A $2B:  BOC      P,+.2
2125 0D46 FB04 A      SKNE     R2,4(R3)
2126 0D47 0201 A      RTS      1      ;FOUND
2127 0D48 2101 A      JMP      $4
2128 0D49      ; NOT FOUND YET
2129 0D49 8302 A $3:  LD      R0,2(R3)
2130 0D4A 1201 A $4:  BOC      P,+.2
2131 0D4B 4B01 A      AISZ     R3,1      ; 5 WORD ENTRY
2132 0D4C 4B04 A      AISZ     R3,4
2133 0D4D FD02 A      SKNE     R3,DITBL
2134 0D4E 0200 A      RTS      ;NOT FOUND
2135 0D4F 21EE A      JMP      $2      ;REPEAT LOOP
2136 0D50 156C A DITBL: .WORD  DITBL2
2137 0D51 1406 A DITBLF: .WORD  DITBLB

2138 0D52      .PAGE  'GET STRING - GNSTRG,GCSTRG,GSTCON'
2139 0D52      ;
2140 0D52      ; GET NEW STRING FIRST 2 CHARACTERS - DO NOT HAVE 1ST QUOTE
2141 0D52      ; JSR      GNSTRG
2142 0D52      ; NONE OR ERROR RETURN (ERROR ALREADY GENERATED)
2143 0D52      ; 2 CHARS IN REG 0 RETURN
2144 0D52      ;
2145 0D52      .LOCAL
2146 0D52      GNSTRG:
2147 0D52 2C9E I      JSR      GNVC
2148 0D53 0200 A      RTS      ;END OF STATEMNT
2149 0D54 F045 B      SKNE     R0,QUOTE
2150 0D55 2101 A      JMP      $2A
2151 0D56 2122 A      JMP      $1      ;ERROR - NOT A STRING
2152 0D57 4C00 A $2A:  LI      R0,0
2153 0D58 A134 A      ST      R0,$END
2154 0D59 4C00 A $2:  LI      R0,0

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2155 0D5A A131 A      ST      R0,$WORD
2156 0D5B 2CEC I $5:  JSR      GNC
2157 0D5C 211C A      JMP      $1                      ;ERROR - ILLEGAL STRING
2158 0D5D F045 B      SKNE     R0,QUOTE
2159 0D5E 2109 A      JMP      $3                      ;QUOTE
2160 0D5F 852C A $7:  LD       R1,$WORD
2161 0D60 3180 A      RXCH     R0,R1
2162 0D61 1502 A      BOC      NZ,$4                      ;JMP IF THIS IS 2ND CHAR
2163 0D62          ;   THIS IS 1ST CHAR
2164 0D62 A529 A      ST       R1,$WORD
2165 0D63 21F7 A      JMP      $5                      ;REPEAT FOR 2ND CHAR
2166 0D64          ;   THIS IS 2ND CHAR
2167 0D64 A528 A $4:  ST       R1,$END                      ;SET END INDIATOR NON ZERO-NOT STRG END
2168 0D65 5C08 A      SHL      R0,8
2169 0D66 C126 A      ADD      R0,$END
2170 0D67 0201 A      RTS      1                      ;2ND RETURN WITH 2 CHRS. IN R0
2171 0D68          ;   DO WE HAVE DOUBLE QUOTE OR CLOSING QUOTE
2172 0D68 2CEC I $3:  JSR      GNC
2173 0D69 2103 A      JMP      $6                      ;CLOSING QUOTE
2174 0D6A F045 B      SKNE     R0,QUOTE
2175 0D6B 21F3 A      JMP      $7                      ;DOUBLE QUOTE
2176 0D6C          ;   CLOSING QUOTE - ZERO OR ONE CHAR STRING
2177 0D6C 7C5E B      DSZ      INPTR                      ;INPUT CHAR PTR
2178 0D6D 811E A $6:  LD       R0,$WORD
2179 0D6E 5C08 A      SHL      R0,8
2180 0D6F 1104 A      BOC      Z,$8
2181 0D70 C034 B      ADD      R0,BLANK
2182 0D71 4D00 A      LI       R1,0
2183 0D72 A51A A $9:  ST       R1,$END                      ;SET STRING END
2184 0D73 0201 A      RTS      1
2185 0D74          ;   WAS A ZERO CHAR STRING
2186 0D74 8118 A $8:  LD       R0,$END
2187 0D75 1101 A      BOC      Z,.-2
2188 0D76 0200 A      RTS      ;STRING CONTINUATION EMPTY
2189 0D77 8048 B      LD       R0,BLANKS
2190 0D78 21F9 A      JMP      $9
2191 0D79          ;   ERROR
2192 0D79 4C18 A $1:  LI       R0,24;                      SYNTAX ERROR
2193 0D7A 2CAA I      JSR      ERROR
2194 0D7B 0200 A $10: RTS                      ;RETURN WITH NO STRING
2195 0D7C          ;
2196 0D7C          ;   GET CONTINUATION OF STRING (2 CHARS AT A TIME)
2197 0D7C          ;   JSR      GCSTRG
2198 0D7C          ;   NONE
2199 0D7C          ;   2 CHARS IN REG 0
2200 0D7C          ;
2201 0D7C 8110 A GCSTRG: LD      R0,$END
2202 0D7D 11FD A      BOC      Z,$10                      ;END
2203 0D7E 21DA A      JMP      $2                      ;NOT END
2204 0D7F          ;
2205 0D7F          ;   GET STRING CONSTANT (2 CHAR STRING) - WE HAVE 1ST QUOTE
2206 0D7F          ;
2207 0D7F          ;   JSR      GSTCON
2208 0D7F          ;   ERROR RETURN
2209 0D7F          ;   2 CHARS IN R0 RETURN
2210 0D7F          ;
2211 0D7F 29D7 A GSTCON: JSR      $2A
2212 0D80 0200 A      RTS                      ;ERROR ALREADY NOTED
2213 0D81 A10A A      ST       R0,$WORD
2214 0D82 810A A      LD       R0,$END
2215 0D83 1106 A      BOC      Z,$11
2216 0D84 2CEC I      JSR      GNC
2217 0D85 2102 A      JMP      $12                      ;NOTE ERROR AND RETURN TO MY CALLER

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2218 0D86 F045 B      SKNE      R0,QUOTE
2219 0D87 2102 A      JMP        $11          ;NOTE ERROR AND RETURN TO MY CALLER
2220 0D88 4C18 A $12:  LI         R0,24;      SYNTAX ERROR
2221 0D89 24AA I      JMP        ERROR
2222 0D8A      ;      LEGAL STRING CONSTANT
2223 0D8A 9101 A $11:  LD         R0,$WORD
2224 0D8B 0201 A      RTS          1
2225 0D8C      ;
2226 0D8C      ;
2227 0D8C 0000 A $WORD: .WORD      0          ;SAVES 2 CHAR RESULT
2228 0D8D 0000 A $END:  .WORD      0          ;0=STRING CONTINUED
2229 0D8E      ;
2230 0D8E      ;
2231 0D8E      ;
2232 0D8E      ;

2233 0D8E      .PAGE    'SCAN SYMBOL TABLE - MAP, GLOBAL SYMBOLS, RESET P BITS'
2234 0D8E      .LOCAL
2235 0D8E      ;
2236 0D8E      ;      SCAN SYMBOL TABLE: OUTPUT MAP,GLOBAL RECORDS AND RESET P BITS
2237 0D8E      ;
2238 0D8E      ;
2239 0D8E      ;      OUTPUT GLOBALS AND RESET P BITS
2240 0D8E      ;
2241 0D8E 4D01 A OGLOB: LI         R1,1
2242 0D8F 2104 A      JMP        $STRT
2243 0D90      ;
2244 0D90      ;      RESET P BITS
2245 0D90      ;
2246 0D90 4D00 A RESETP: LI         R1,0
2247 0D91 2102 A      JMP        $STRT
2248 0D92      ;
2249 0D92      ;      OUTPUT MAP AND RESET P BITS
2250 0D92      ;
2251 0D92      OMAP:
2252 0D92      .IF        SIZE8
2253 0D92 2CED I      JSR        MAPSOR
2254 0D93 21FC A      JMP        RESETP
2255 0D94 802F B $STRT: LD         R0,XFFF7
2256 0D95 2102 A      JMP        $STR1
2257 0D96 0D97 A $LAST: .=.+1
2258 0D97      ;
2259 0D97      ;      OUTPUT MAP    NO RESET OF P BITS
2260 0D97      ;
2261 0D97      OMAPNR:
2262 0D97      .IF        SIZE8
2263 0D97 24ED I      JMP        MAPSOR
2264 0D98 A162 A $STR1: ST         R0,$FLAG
2265 0D99 A562 A      ST         R1,$MG      ;MAP OR GLOBAL INDICATOR
2266 0D9A 4C01 A      LI         R0,1
2267 0D9B A158 A      ST         R0,$GLBN    ;GLOBAL NUMBER
2268 0D9C 8C64 B      LD         R3,TOPA
2269 0D9D 8865 B      LD         R2,NEXTA
2270 0D9E 2904 A      JSR        SCANST
2271 0D9F 8C67 B      LD         R3,TOPB
2272 0DA0 9868 B      LD         R2,NEXTB
2273 0DA1 2901 A      JSR        SCANST
2274 0DA2 0200 A      RTS
2275 0DA3      ;
2276 0DA3      SCANST:
2277 0DA3 A9F2 A      ST         R2,$LAST
2278 0DA4      $LOOP:

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2279 0DA4 FDF1 A      SKNE    R3,$LAST
2280 0DA5 0200 A      RTS
2281 0DA6 8155 A      LD      R0,$MG
2282 0DA7 1401 A      BOC     BLEQ1,.,+2
2283 0DA8 2101 A      JMP     $300      ;NO MAP
2284 0DA9 295B A      JSR     MAPLIN
2285 0DAA          $300:
2286 0DAA          ;
2287 0DAA 83FF A      LD      R0,-1(R3)
2288 0DAB 5CFE A      SHR     R0,2
2289 0DAC 1301 A      BOC     ODD,.,+2      ;YES GLOBAL
2290 0DAD 212E A      JMP     $6      ;NO GLOBAL
2291 0DAE          ;
2292 0DAE 814C A      LD      R0,$FLAG
2293 0DAF 5000 A      CAI     R0,0
2294 0DB0 1109 A      BOC     Z,$3A      ;NO
2295 0DB1 83FF A      LD      R0,-1(R3)
2296 0DB2 6027 B      AND     R0,K3
2297 0DB3 1506 A      BOC     NZ,$3A      ;NO
2298 0DB4 8300 A      LD      R0,0(R3)
2299 0DB5 602C B      AND     R0,K4
2300 0DB6 1103 A      BOC     Z,$3A      ;GLOBAL NOT USED
2301 0DB7          ;
2302 0DB7 813C A      LD      R0,$GLBN
2303 0DB8 A3FE A      ST      R0,-2(R3)
2304 0DB9 793A A      ISZ     $GLBN
2305 0DBA          ;
2306 0DBA          $3A:
2307 0DBA 8141 A      LD      R0,$MG
2308 0DBB 1301 A      BOC     ODD,.,+2
2309 0DBC 211F A      JMP     $6      ;GLOBAL NOT REQUESTED
2310 0DBD 83FF A      LD      R0,-1(R3)
2311 0DBE 6027 B      AND     R0,K3
2312 0DBF 1503 A      BOC     NZ,$5
2313 0DC0 8300 A      LD      R0,0(R3)
2314 0DC1 602C B      AND     R0,K4
2315 0DC2 1119 A      BOC     Z,$6
2316 0DC3          ;
2317 0DC3          ;
2318 0DC3          ;
2319 0DC3          ;
2320 0DC3          ;
2321 0DC3          $5:
2322 0DC3 8300 A      LD      R0,0(R3)
2323 0DC4 291F A      JSR     $CONV
2324 0DC5 A13B A      ST      R0,$LBUF+3
2325 0DC6 83FF A      LD      R0,-1(R3)
2326 0DC7 291C A      JSR     $CONV
2327 0DC8 A139 A      ST      R0,$LBUF+4
2328 0DC9 8300 A      LD      R0,0(R3)
2329 0DCA 97FD A      LD      R1,-3(R3)
2330 0DCB 1301 A      BOC     ODD,.,+2
2331 0DCC 9448 B      LD      R1,BLANKS
2332 0DCD 291D A      JSR     $CBZ
2333 0DCE A134 A      ST      R0,$LBUF+5
2334 0DCF 83FE A      LD      R0,-2(R3)
2335 0DD0 A133 A      ST      R0,$LBUF+6
2336 0DD1 83FF A      LD      R0,-1(R3)
2337 0DD2 6027 B      AND     R0,K3
2338 0DD3 1501 A      BOC     NZ,.,+2
2339 0DD4 4C04 A      LI      R0,4
2340 0DD5 D026 B      SUB     R0,K1
2341 0DD6 5C0E A      SHL     R0,14

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2342 0DD7 A128 A      ST      R0, GLBUF+2
2343 0DD8 4300 A      PUSH    R3
2344 0DD9 8D23 A      LD      R3, GLBUF-1
2345 0DDA 2CCB I      JSR     CKPNCH
2346 0ddb 4700 A      PULL    R3
2347 0DDC          ;
2348 0DDC          ;      BOTTOM OF LOOP
2349 0DDC          ;
2350 0DDC 83FF A $6:   LD      R0, -1(R3)
2351 0DDD 611D A      AND     R0, $FLAG
2352 0DDE A3FF A      ST      R0, -1(R3)      ;RESET P BIT
2353 0DDF 8300 A      LD      R0, 0(R3)
2354 0DE0 6027 B      AND     R0, K3
2355 0DE1 50FE A      CAI     R0, -2
2356 0DE2 3300 A      RADD    R0, R3      ;UPDATE TABLE PTR.
2357 0DE3 21C0 A      JMP     $LOOP
2358 0DE4          ;
2359 0DE4          ;      CONVERT 6 BIT NAME IN R0 TO 8 BIT NAME
2360 0DE4          ;
2361 0DE4 5CFC A $CONV: SHR    R0, 4
2362 0DE5 3181 A      RCPY    R0, R1
2363 0DE6 603B B      AND     R0, HEX3F
2364 0DE7 5DFA A      SHR     R1, 6
2365 0DE8 5D08 A      SHL     R1, 8
2366 0DE9 3100 A      RADD    R0, R1
2367 0DEA C508 A      ADD     R1, X2020
2368 0DEB          ;
2369 0DEB          ;      CONVERT BLANKS TO ZERO
2370 0DEB          ;
2371 0DEB 4C00 A $CBZ:  LI     R0, 0
2372 0DEC F448 B      SKNE    R1, BLANKS
2373 0DED 0200 A      RTS
2374 0DEE 3491 A      RCPY    R1, R0
2375 0DEF 6424 B      AND     R1, K255
2376 0DF0 F434 B      SKNE    R1, BLANK
2377 0DF1 6042 B      AND     R0, XFF00
2378 0DF2 0200 A      RTS
2379 0DF3          ;
2380 0DF3 2020 A X2020: .WORD   02020
2381 0DF4 0000 A $GLBN: .WORD   0      ;GLOBAL NUMBER
2382 0DF5 0DF6 A $NEXT:  .=. +1
2383 0DF6 0DF7 A $PT:    .=. +1
2384 0DF7 0DF8 A $CT:    .=. +1
2385 0DF8 464F A $FO:    .WORD   'FO'
2386 0DF9 524D A $RM:    .WORD   'RM'
2387 0DFA 1089 A $RTB:    .WORD   RELTB+1
2388 0DFB 0DFC A $FLAG:  .=. +1      ;FFFF IF MAP DIRECTIVE ELSE FFF7
2389 0DFC 0DFD A $MG:    .=. +1      ;MAP/GLOB INDICATOR 0=NONE 1=GLOBAL 2=MAP
2390 0DFD 0DFE A          .WORD   .+1
2391 0DFE 4005 A GLBUF:  .WORD   04005
2392 0DFF 0E05 A          .=. +6
2393 0E05          ;
2394 0E05          ;      PRINT 1 MAP LINE
2395 0E05          ;
2396 0E05          ;      MAPLIN:
2397 0E05 ADEF A      ST      R3, $NEXT
2398 0E06 7C71 B      DSZ     PGRL
2399 0E07 2102 A      JMP     .+3
2400 0E08 4F07 A      LI     R3, 7
2401 0E09 2CDF I      JSR     OPGSTR      ;OUTPUT PAGE STRING
2402 0E0A 2CA5 I      JSR     NEWLIN
2403 0E0B          ;      NEW ENTRY
2404 0E0B 8DE9 A      LD      R3, $NEXT

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2405 0E0C 8300 A      LD      R0,0(R3)
2406 0E0D 6029 B      AND      R0,K8
2407 0E0E 1103 A      BOC      Z,$NLCL          ;NON LOCAL
2408 0E0F          ;      LOCAL SYMBOL
2409 0E0F 4C24 A      LI      R0,'$'/256
2410 0E10 2CEE I      JSR      O1CH          ;OUT $ (1ST CHAR)
2411 0E11 2104 A      JMP      $1          ; GO TO 2ND CHAR
2412 0E12          ;      NON LOCAL
2413 0E12          ;      SNLCL:
2414 0E12 8300 A      LD      R0,0(R3)
2415 0E13 5CF6 A      SHR      R0,10
2416 0E14 C034 B      ADD      R0,HEX20
2417 0E15 2CEE I      JSR      O1CH          ;OUT 1ST CHAR
2418 0E16 8300 A $1:  LD      R0,0(R3)
2419 0E17 5CFC A      SHR      R0,4
2420 0E18 603B B      AND      R0,HEX3F
2421 0E19 C034 B      ADD      R0,HEX20
2422 0E1A 2CEE I      JSR      O1CH          ;OUT 2ND CHAR
2423 0E1B 83FF A      LD      R0,-1(R3)
2424 0E1C 5CF6 A      SHR      R0,10
2425 0E1D C034 B      ADD      R0,HEX20
2426 0E1E 2CEE I      JSR      O1CH          ;OUT 3RD CHAR
2427 0E1F 83FF A      LD      R0,-1(R3)
2428 0E20 5CFC A      SHR      R0,4
2429 0E21 603B B      AND      R0,HEX3F
2430 0E22 C034 B      ADD      R0,HEX20
2431 0E23 2CEE I      JSR      O1CH          ;OUT 4TH CHAR
2432 0E24          ;      DO WE HAVE A LONG SYMBOL
2433 0E24 8300 A      LD      R0,0(R3)
2434 0E25 1302 A      BOC      ODD,$LONG
2435 0E26          ;      SHORT SYMBOL
2436 0E26 2CEF I      JSR      O2B          ;OUTPUT 2 BLANKS
2437 0E27 2102 A      JMP      $2
2438 0E28          ;      LONG SYMBOL
2439 0E28 83FD A $LONG: LD      R0,-3(R3)
2440 0E29 2CCD I      JSR      O2CH
2441 0E2A          ;
2442 0E2A          ;      OUTPUT VALUE
2443 0E2A 2CEF I $2:  JSR      O2B
2444 0E2B 8300 A      LD      R0,0(R3)
2445 0E2C 1401 A      BOC      B1EQ1,$2A
2446 0E2D 2105 A      JMP      $2B
2447 0E2E          ;      FORM ENTRY
2448 0E2E 81C9 A $2A: LD      R0,$FO          ;OUTPUT 'FORM'
2449 0E2F 2CCD I      JSR      O2CH
2450 0E30 81C8 A      LD      R0,$RM
2451 0E31 2CCD I      JSR      O2CH
2452 0E32 2109 A      JMP      $7
2453 0E33          ;      $2B:
2454 0E33 83FE A      LD      R0,-2(R3)
2455 0E34 2CD2 I      JSR      OHEX
2456 0E35 2CF0 I      JSR      O1B
2457 0E36 83FF A      LD      R0,-1(R3)
2458 0E37 602A B      AND      R0,K7
2459 0E38 3281 A      RCPY      R0,R2
2460 0E39 C9C0 A      ADD      R2,$RTB
2461 0E3A 8200 A      LD      R0,0(R2)
2462 0E3B 2CCD I      JSR      O2CH          ;OUTPUT REL KEY
2463 0E3C          ;
2464 0E3C 4C2A A $7:  LI      R0,'*'/256
2465 0E3D 8700 A      LD      R1,0(R3)
2466 0E3E 742C B      SKAZ      R1,K4
2467 0E3F 4C20 A      LI      R0,' '/256

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2468 0E40 2CEE I      JSR      01CH
2469 0E41             .IF      DBGVER
2470 0E41 8099 B      LD        R0,MAPDEB
2471 0E42 110F A      BOC      Z,$3          ;NOT DEBUG MODE
2472 0E43             ;
2473 0E43             ;      DEBUGGING
2474 0E43 2CEF I      JSR      02B
2475 0E44 8300 A      LD        R0,0(R3)
2476 0E45 6027 B      AND       R0,K3
2477 0E46 C027 B      ADD       R0,K3
2478 0E47 A1AF A      ST        R0,$CT
2479 0E48 ADAD A      ST        R3,$PT
2480 0E49 2CEF I      JSR      02B
2481 0E4A 81AB A      LD        R0,$PT
2482 0E4B 2CD2 I      JSR      OHEX
2483 0E4C             $4:
2484 0E4C 2CEF I      JSR      02B
2485 0E4D 91A8 A      LD        R0,$PT
2486 0E4E 2CD2 I      JSR      OHEX
2487 0E4F 7DA6 A      DSZ       $PT
2488 0E50 7DA6 A      DSZ       $CT
2489 0E51 21FA A      JMP       $4
2490 0E52             .ENDIF
2491 0E52             ;      FINISHED SPECIAL DEBUG CODE
2492 0E52             ;
2493 0E52 0200 A $3:   RTS
2494 0E53             .IF      SIZE8

2495 0E53             .PAGE    'SORTED MAP PRINT'
2496 0E53             .LOCAL
2497 0E53             ;
2498 0E53             ;      SORTED MAP PRINT
2499 0E53             ;
2500 0E53 4C00 A MAPSOR: LI      R0,0
2501 0E54 A15A A      ST        R0,$LST0
2502 0E55 8155 A $100: LD      R0,X7FFF
2503 0E56 A155 A      ST        R0,$LOW0
2504 0E57 8865 B      LD        R2,NEXTA
2505 0E58 8C64 B      LD        R3,TOPA
2506 0E59 290F A      JSR      $MPS
2507 0E5A 8868 B      LD        R2,NEXTB
2508 0E5B 8C67 B      LD        R3,TOPB
2509 0E5C 290C A      JSR      $MPS
2510 0E5D 814E A      LD        R0,$LOW0
2511 0E5E F14C A      SKNE     R0,X7FFF
2512 0E5F 0200 A      RTS
2513 0E60 8D53 A      LD        R3,$XR3
2514 0E61 29A3 A      JSR      MAPLIN
2515 0E62 8149 A      LD        R0,$LOW0
2516 0E63 A14B A      ST        R0,$LST0
2517 0E64 8148 A      LD        R0,$LOW1
2518 0E65 A14A A      ST        R0,$LST1
2519 0E66 8147 A      LD        R0,$LOW2
2520 0E67 A149 A      ST        R0,$LST2
2521 0E68 21EC A      JMP      $100
2522 0E69             ;
2523 0E69             ;      MAP SEARCH FOR LOWEST SYMBOL NOT YET PRINTED
2524 0E69             ;
2525 0E69 A948 A $MPS: ST        R2,$END
2526 0E6A 213D A      JMP      $BOTM
2527 0E6B             ;
2528 0E6B             ;      LOAD WORD 0 INTO R2

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2529 0E6B      ;
2530 0E6B 8300 A $LOOP: LD      R0,0(R3)
2531 0E6C 5CFD A      SHR      R0,3
2532 0E6D 1301 A      BOC      ODD,$20
2533 0E6E 2102 A      JMP      $21
2534 0E6F 6143 A $20:  AND      R0,HEX7E
2535 0E70 6944 A      OR       R0,X4000
2536 0E71 3281 A $21:  RCPY     R0,R2
2537 0E72      ;
2538 0E72      ;      QUICK RANGE TEST
2539 0E72      ;
2540 0E72 E139 A      SKG      R0,$LOW0
2541 0E73 2101 A      JMP      .+2
2542 0E74 212F A      JMP      $NXT
2543 0E75 F139 A      SKNE     R0,$LST0
2544 0E76 2102 A      JMP      $19
2545 0E77 E137 A      SKG      R0,$LST0
2546 0E78 212B A      JMP      $NXT
2547 0E79      ;
2548 0E79      ;      LOAD WORD 2 INTO R1
2549 0E79      ;
2550 0E79 8300 A $19:  LD      R0,0(R3)
2551 0E7A 8448 B      LD      R1,BLANKS
2552 0E7B 7026 B      SKAZ     R0,K1
2553 0E7C 87FD A      LD      R1,-3(R3)
2554 0E7D 7029 B      SKAZ     R0,K8
2555 0E7E 2101 A      JMP      $22
2556 0E7F 2103 A      JMP      $23      ; LOCAL
2557 0E80 6442 B $22:  AND      R1,XFF00
2558 0E81 5CF6 A      SHR      R0,10
2559 0E82 3100 A      RADD     R0,R1
2560 0E83      ;
2561 0E83      ;      LOAD WORD 1 INTO R0
2562 0E83      ;
2563 0E83 83FF A $23:  LD      R0,-1(R3)
2564 0E84 5CFC A      SHR      R0,4
2565 0E85      ;
2566 0E85      ;      COMPARE FOR > THAN LAST SYMBOL PRINTED
2567 0E85 F929 A      SKNE     R2,$LST0
2568 0E86 2103 A      JMP      $GR1
2569 0E87 E927 A      SKG      R2,$LST0
2570 0E88 211B A      JMP      $NXT
2571 0E89 2107 A      JMP      $GR
2572 0E8A F125 A $GR1: SKNE     R0,$LST1
2573 0E8B 2103 A      JMP      $GR2
2574 0E8C E123 A      SKG      R0,$LST1
2575 0E8D 2116 A      JMP      $NXT
2576 0E8E 2102 A      JMP      $GR
2577 0E8F E521 A $GR2: SKG      R1,$LST2
2578 0E90 2113 A      JMP      $NXT
2579 0E91      ;
2580 0E91      ;      GREATER, NOW TEST < THAN CURRENT LOW SYMBOL
2581 0E91      ;
2582 0E91 E91A A $GR:  SKG      R2,$LOW0
2583 0E92 2101 A      JMP      .+2
2584 0E93 2110 A      JMP      $NXT
2585 0E94 F917 A      SKNE     R2,$LOW0
2586 0E95 2101 A      JMP      .+2
2587 0E96 2109 A      JMP      $GOOD
2588 0E97 E115 A      SKG      R0,$LOW1
2589 0E98 2101 A      JMP      .+2
2590 0E99 210A A      JMP      $NXT
2591 0E9A F112 A      SKNE     R0,$LOW1

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2592 0E9B 2101 A      JMP      .+2
2593 0E9C 2103 A      JMP      $GOOD
2594 0E9D E510 A      SKG      R1,$LOW2
2595 0E9E F50F A      SKNE     R1,$LOW2
2596 0E9F 2104 A      JMP      $NXT
2597 0EA0 A10C A $GOOD: ST      R0,$LOW1
2598 0EA1 A50C A      ST      R1,$LOW2
2599 0EA2 A909 A      ST      R2,$LOW0
2600 0EA3 AD10 A      ST      R3,$XR3
2601 0EA4 8300 A $NXT: LD      R0,0(R3)
2602 0EA5 6027 B      AND      R0,K3
2603 0EA6 50FE A      CAI      R0,-2
2604 0EA7 3300 A      RADD     R0,R3
2605 0EA8 FD09 A $BOTM: SKNE     R3,$END
2606 0EA9 0200 A      RTS
2607 0EAA 21C0 A      JMP      $LOOP
2608 0EAB      ;
2609 0EAB 7FFF A X7FFF: .WORD    07FFF
2610 0EAC 0EAD A $LOW0: .=.+1
2611 0EAD 0EAE A $LOW1: .=.+1
2612 0EAE 0EAF A $LOW2: .=.+1
2613 0EAF 0EB0 A $LST0: .=.+1
2614 0EB0 0EB1 A $LST1: .=.+1
2615 0EB1 0EB2 A $LST2: .=.+1
2616 0EB2 0EB3 A $END:  .=.+1
2617 0EB3 007E A HEX7E: .WORD    07E
2618 0EB4 0EB5 A $XR3:  .=.+1
2619 0EB5 4000 A X4000: .WORD    04000
2620 0EB6      .ENDIF

2621 0EB6      .PAGE    'INSTRUCTION CLASS PROCESSING'
2622 0EB6      .LOCAL
2623 0EB6      ;
2624 0EB6      ;      LD,ST      REG,@ADR(X)
2625 0EB6      ;      -----
2626 0EB6 2CF1 I IC1:  JSR      EXPP2
2627 0EB7 2CF2 I      JSR      INERR
2628 0EB8 5C0A A      SHL      R0,10
2629 0EB9 C072 B      ADD      R0,IVAL
2630 0EBA A072 B      ST      R0,IVAL
2631 0EBB 2C9D I      JSR      GCOMMA
2632 0EBC 214A A      JMP      $80
2633 0EBD 2C9E I      JSR      GNVC
2634 0EBE 2103 A      JMP      $11
2635 0EBF F032 B      SKNE     R0,CAT
2636 0EC0 2104 A      JMP      $12
2637 0EC1 7C5E B      DSZ      INPTR      ;INPUT CHAR PTR
2638 0EC2 803E B $11:  LD      R0,X1000
2639 0EC3 2CF3 I      JSR      GADRIX      ;GET ADR ,ALLOW INDIRECT, ALLOW INDEX
2640 0EC4 210D A      JMP      $41
2641 0EC5 8072 B $12:  LD      R0,IVAL
2642 0EC6 C03E B      ADD      R0,X1000      ;SET INDIRECT
2643 0EC7 A072 B      ST      R0,IVAL
2644 0EC8 2CF4 I      JSR      GADRX
2645 0EC9 2108 A      JMP      $41
2646 0ECA      ;
2647 0ECA      ;      ADD,SUB,SKG,SKNE      REG,ADR(X)
2648 0ECA      ;      -----
2649 0ECA 2CF1 I IC2:  JSR      EXPP2
2650 0ECB 2CF2 I      JSR      INERR
2651 0ECC 5C0A A      SHL      R0,10
2652 0ECD C072 B $21:  ADD      R0,IVAL

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2653	0ECE	A072	B	ST	R0,IVAL	
2654	0ECF	2C9D	I	JSR	GCOMMA	
2655	0ED0	2136	A	JMP	S80	
2656	0ED1					
2657	0ED1			ISZ,DSZ		ADR(X)
2658	0ED1					
2659	0ED1	2CF4	I	IC4: JSR	GADRX	;GET ADR,X OK, NO INDIRECT ALLOWED
2660	0ED2	8072	B	\$41: LD	R0,IVAL	
2661	0ED3	855F	A	LD	R1,IREL	;INSTRUCTION RELOCATION MODE
2662	0ED4	24F5	I	JMP	INOUT	
2663	0ED5					
2664	0ED5			AND,OR,SKAZ		REG0/1,ADR(X)
2665	0ED5					-----
2666	0ED5	2CF6	I	IC3: JSR	EXPP1	
2667	0ED6	2CF2	I	JSR	INERR	
2668	0ED7	5C0A	A	SHL	R0,10	
2669	0ED8	21F4	A	JMP	\$21	
2670	0ED9					
2671	0ED9			NOP,PULLF,PUSHF,HALT		NO ARG
2672	0ED9					
2673	0ED9	8072	B	IC5: LD	R0,IVAL	
2674	0EDA	24F7	I	JMP	INABS	;INSTR. ABS
2675	0EDB					
2676	0EDB			ISCAN		NO ARG
2677	0EDB					
2678	0EDB	15FD	A	IC5A: BOC	NZ,IC5	;EXTD OK
2679	0EDC	2CF8	I	JSR	QERROR	
2680	0EDD	21FB	A	JMP	IC5	
2681	0EDE					
2682	0EDE			PUSH,PULL,XCHRS		REG
2683	0EDE					---
2684	0EDE	2CF1	I	IC6: JSR	EXPP2	
2685	0EDF	2CF2	I	JSR	INERR	; INSTR ERROR
2686	0EE0	5C08	A	SHL	R0,8	
2687	0EE1	C072	B	ADD	R0,IVAL	
2688	0EE2	24F7	I	JMP	INABS	
2689	0EE3					
2690	0EE3			AISZ,LI,CAI,ROL,SHL		REG,IMMED 8 BIT
2691	0EE3					-----
2692	0EE3	2CF1	I	IC7: JSR	EXPP2	
2693	0EE4	2CF2	I	JSR	INERR	
2694	0EE5	5C08	A	SHL	R0,8	
2695	0EE6	C072	B	ADD	R0,IVAL	
2696	0EE7	A072	B	ST	R0,IVAL	
2697	0EE8	2C9D	I	JSR	GCOMMA	
2698	0EE9	211D	A	JMP	S80	
2699	0EEA	2CF9	I	JSR	EXP8	
2700	0EEB	2CF2	I	JSR	INERR	
2701	0EEC	C072	B	ADD	R0,IVAL	
2702	0EED	24F7	I	JMP	INABS	
2703	0EEE					
2704	0EEE			ROR,SHR		REG,IMMED 8 BIT
2705	0EEE					-----
2706	0EEE	2CF1	I	IC7A: JSR	EXPP2	
2707	0EEF	2CF2	I	JSR	INERR	
2708	0EF0	5C08	A	SHL	R0,8	
2709	0EF1	C072	B	ADD	R0,IVAL	
2710	0EF2	A072	B	ST	R0,IVAL	
2711	0EF3	2C9D	I	JSR	GCOMMA	
2712	0EF4	2112	A	JMP	S80	
2713	0EF5	2CF9	I	JSR	EXP9	
2714	0EF6	2CF2	I	JSR	INERR	
2715	0EF7	5001	A	CAI	R0,1	

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2716 0EF8 6024 B      AND      R0,K255
2717 0EF9 C072 B      ADD      R0,IVAL
2718 0EFA 24F7 I      JMP      INABS
2719 0EFB              ;
2720 0EFB              ;      RADD,RXCH,RCPY,RXOR,RAND      REG,REG
2721 0EFB              ;      -----
2722 0EFB 2CF1 I      IC8:   JSR      EXPP2
2723 0EFC 2CF2 I      JSR      INERR
2724 0EFD 5C0A A      SHL      R0,10
2725 0EFE C072 B      ADD      R0,IVAL
2726 0EFF A072 B      ST       R0,IVAL
2727 0F00 2C9D I      JSR      GCOMMA
2728 0F01 2105 A      JMP      $80
2729 0F02 2CF1 I      JSR      EXPP2
2730 0F03 297B A      JSR      INERR
2731 0F04 5C08 A      SHL      R0,8
2732 0F05 C072 B      ADD      R0,IVAL
2733 0F06 24F7 I      JMP      INABS
2734 0F07              ;
2735 0F07 2CFA I      $80:   JSR      MERROR
2736 0F08 8072 B      LD       R0,IVAL
2737 0F09 24F7 I      JMP      INABS
2738 0F0A              ;
2739 0F0A              ;      JMP,JSR      @ADR(X)
2740 0F0A              ;      ---
2741 0F0A 2C9E I      IC9:   JSR      GNVC
2742 0F0B 2103 A      JMP      $91      ;NONE
2743 0F0C F032 B      SKNE     R0,CAT
2744 0F0D 2104 A      JMP      $92
2745 0F0E 7C5E B      DSZ      INPTR      ;INPUT CHAR PTR
2746 0F0F 803D B      $91:   LD       R0,HEX400
2747 0F10 2CF3 I      JSR      GADRIX
2748 0F11 21C0 A      JMP      $41
2749 0F12 8072 B      $92:   LD       R0,IVAL
2750 0F13 C03D B      ADD      R0,HEX400
2751 0F14 A072 B      ST       R0,IVAL
2752 0F15 297B A      JSR      GADRX
2753 0F16 21BB A      JMP      $41
2754 0F17              ;
2755 0F17              ;      SFLG,PFLG      POS3,POS7
2756 0F17              ;      -----
2757 0F17 2CFB I      IC10:  JSR      EXPP3
2758 0F18 2966 A      JSR      INERR
2759 0F19 5C08 A      SHL      R0,8
2760 0F1A C072 B      ADD      R0,IVAL
2761 0F1B A072 B      ST       R0,IVAL
2762 0F1C 2C9D I      JSR      GCOMMA
2763 0F1D 24F7 I      JMP      INABS
2764 0F1E 2CDA I      JSR      EXPP7
2765 0F1F 3081 A      NOP
2766 0F20 C072 B      ADD      R0,IVAL
2767 0F21 24F7 I      JMP      INABS
2768 0F22              ;
2769 0F22              ;      BOC      POS4,SPADR
2770 0F22              ;      -----
2771 0F22 2CFC I      IC11:  JSR      EXPP4
2772 0F23 295B A      JSR      INERR
2773 0F24 5C08 A      SHL      R0,8
2774 0F25 C072 B      ADD      R0,IVAL
2775 0F26 A072 B      ST       R0,IVAL
2776 0F27 2C9D I      JSR      GCOMMA
2777 0F28 295F A      JSR      MERROR
2778 0F29 2CB9 I      JSR      EXP

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2779 0F2A 2954 A      JSR      INERR
2780 0F2B 2CFD I      JSR      SPADR
2781 0F2C 2103 A      JMP      $111          ;NOT VALID SOECIAL ADR
2782 0F2D D03F BS     SUB      R0,K256
2783 0F2E A072 B      ST       R0,IVAL
2784 0F2F 24F7 I      JMP      INABS
2785 0F30 2955 A $111: JSR      ADERR
2786 0F31 8072 B      LD       R0,IVAL
2787 0F32 24F7 I      JMP      INABS
2788 0F33 0F34 A IREL: .=.+1          ;INSTRUCTION RELOCATION MODE
2789 0F34          ;
2790 0F34          ;      RTS,RTI,RIN,ROUT      POS7
2791 0F34          ;
2792 0F34 2CDA I IC12: JSR      EXPP7
2793 0F35 3081 A      NOP
2794 0F36 C072 B      ADD      R0,IVAL
2795 0F37 24F7 I      JMP      INABS
2796 0F38          ;
2797 0F38          ;      JSRP              POS7
2798 0F38          ;      ----
2799 0F38 1501 A IC12A: BOC      NZ,+.2
2800 0F39 2945 A      JSR      INERR
2801 0F3A 2CDA I      JSR      EXPP7
2802 0F3B 294C A      JSR      MERROR
2803 0F3C C072 B      ADD      R0,IVAL
2804 0F3D 24F7 I      JMP      INABS
2805 0F3E          ;
2806 0F3E          ;      JINT,SETST,CLRST,SETBIT,CLRBIT,CMPBIT,JMPP
2807 0F3E          ;      POS4
2808 0F3E          ;      ----
2809 0F3E 1501 A IC13A: BOC      NZ,IC13      ;EXTD OK
2810 0F3F 2944 A      JSR      QERROR
2811 0F40          ;
2812 0F40 2CFC I IC13: JSR      EXPP4
2813 0F41 293D A      JSR      INERR
2814 0F42 C072 B      ADD      R0,IVAL
2815 0F43 24F7 I      JMP      INABS
2816 0F44          ;
2817 0F44          ;      MPY,DIV,DADD,DSUB      ADR(X)
2818 0F44          ;      ---
2819 0F44 291A A IC14: JSR      DBWIN
2820 0F45 24F5 I      JMP      INOUT
2821 0F46          ;
2822 0F46          ;      LDB,STB,LLB,SLB      ADR(X)
2823 0F46          ;      ---
2824 0F46 2918 A IC15: JSR      DBWIN
2825 0F47 5C01 A      SHL      R0,1
2826 0F48 2103 A      JMP      IC16A
2827 0F49          ;
2828 0F49          ;      LRB,SRB      ADR(X)
2829 0F49          ;      ---
2830 0F49 2915 A IC16: JSR      DBWIN
2831 0F4A 5C01 A      SHL      R0,1
2832 0F4B C026 B      ADD      R0,K1
2833 0F4C F426 B IC16A: SKNE     R1,K1
2834 0F4D 24F5 I      JMP      INOUT
2835 0F4E 2937 A      JSR      ADERR
2836 0F4F 24F5 I      JMP      INOUT
2837 0F50          ;
2838 0F50          ;      JSRI              ADR      SPECIAL VALUE
2839 0F50          ;      ---
2840 0F50 2CB9 I IC17: JSR      EXP
2841 0F51 292D A      JSR      INERR

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2842 0F52 F426 B      SKNE    R1,K1
2843 0F53 2103 A      JMP     .+4
2844 0F54 2931 A      JSR     ADDRERR
2845 0F55 9072 B      LD      R0,IVAL
2846 0F56 24F7 I      JMP     INABS
2847 0F57 683A B      OR      R0,HEX7F
2848 0F58 5000 A      CAI     R0,0
2849 0F59 15FA A      BOC     NZ,..-5
2850 0F5A 807A B      LD      R0,EXPVAL      ;EXPRESSION VALUE
2851 0F5B 5C09 A      SHL     R0,9
2852 0F5C 5CF7 A      SHR     R0,9
2853 0F5D C072 B      ADD     R0,IVAL
2854 0F5E 24F7 I      JMP     INABS
2855 0F5F          ;
2856 0F5F          ;      DOUBLE WORD INSTRUCTION SUBROUTINE
2857 0F5F          ;
2858 0F5F          ;      DBWIN:
2859 0F5F 1501 A      BOC     NZ,..+2
2860 0F60 2923 A      JSR     QERROR
2861 0F61 2CB9 I      JSR     EXP
2862 0F62 2925 A      JSR     MERROR
2863 0F63 A119 A      ST      R0,$VAL
2864 0F64 A519 A      ST      R1,$REL
2865 0F65 2C9E I      JSR     GNVC
2866 0F66 2110 A      JMP     SNOX      ;NO INDEXING
2867 0F67 F046 B      SKNE    R0,LPAREN
2868 0F68 2102 A      JMP     .+3
2869 0F69 7C5E B      DSZ     INPTR      ;INPUT CHAR PTR
2870 0F6A 210C A      JMP     SNOX      ;NO INDEXING
2871 0F6B          ;      INDEXING USED
2872 0F6B 2CF1 I      JSR     EXPP2
2873 0F6C 291B A      JSR     MERROR
2874 0F6D E026 B      SKG     R0,K1
2875 0F6E 291B A      JSR     VERROR
2876 0F6F 5C08 A      SHL     R0,8
2877 0F70 C072 B      ADD     R0,IVAL
2878 0F71 A072 B      ST      R0,IVAL
2879 0F72 2C9E I      JSR     GNVC
2880 0F73 2918 A      JSR     $XERR
2881 0F74 F043 B      SKNE    R0,RPAREN
2882 0F75 2101 A      JMP     .+2
2883 0F76 2915 A      JSR     $XERR
2884 0F77 8072 B      SNOX:   LD      R0,IVAL
2885 0F78 4D01 A      LI      R1,1
2886 0F79 2CAB I      JSR     OUTWRD
2887 0F7A 9102 A      LD      R0,$VAL
2888 0F7B 9502 A      LD      R1,$REL
2889 0F7C 0200 A      RTS
2890 0F7D          ;
2891 0F7D 0F7E A      $VAL:   .=.+1
2892 0F7E 0F7F A      $REL:   .=.+1
2893 0F7F          ;
2894 0F7F          ;      INSTRUCTION ERROR
2895 0F7F          ;
2896 0F7F 4C00 A      INERR:  LI      R0,0;      MISSING ARGUMENT ERROR
2897 0F80          INERR1:
2898 0F80 2CAA I      JSR     ERROR
2899 0F81 807A B      LD      R0,EXPVAL      ;EXPRESSION VALUE
2900 0F82 847C B      LD      R1,EXPVAL      ;EXPRESSION RELOCATION MODE
2901 0F83 0200 A      RTS
2902 0F84          ;
2903 0F84 4C36 A      OERROR:  LI      R0,54;      EXTENDED INSTR. ERROR
2904 0F85 24AA I      JMP     ERROR

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2905 0F86      ;
2906 0F86 4C0C A  ADDRERR: LI      R0,12;      ADDRESS ERROR
2907 0F87 21F8 A          JMP      INERR1
2908 0F88      ;
2909 0F88 4C00 A  MERROR: LI      R0,0;      MISSING ARG. ERROR
2910 0F89 21F6 A          JMP      INERR1
2911 0F8A      ;
2912 0F8A 4C06 A  VERROR: LI      R0,6;      VALUE ERROR
2913 0F8B 21F4 A          JMP      INERR1
2914 0F8C      ;
2915 0F8C 4C18 A  SXERR:  LI      R0,24;     SYNTAX ERROR
2916 0F8D 21F2 A          JMP      INERR1

2917 0F8E      .PAGE  'ADDRESS ROUTINES'
2918 0F8E      .LOCAL
2919 0F8E 4C00 A  GADR:  LI      R0,0      ;NO INDIRECT PERMITTED
2920 0F8F 4D00 A  GADRI: LI      R1,0      ;NO INDEXING PERMITTED
2921 0F90 2102 A          JMP      $ADR
2922 0F91      ;
2923 0F91      ;
2924 0F91 4C00 A  GADRX: LI      R0,0      ;NO INDIRECT PERMITTED
2925 0F92 4D01 A  GADRIX: LI     R1,1      ;INDEXING PERMITTED
2926 0F93      ;
2927 0F93 A17C A  $ADR:  ST      R0,$IFLAG
2928 0F94 A57C A          ST      R1,$XFLAG
2929 0F95 2CB9 I          JSR      EXP
2930 0F96 214B A          JMP      SMERR
2931 0F97 847C B          LD      R1,EXPREL      ;SAVE RELOC MODE FOR DISPLACEMENT
2932 0F98 A59A A          ST      R1,IREL
2933 0F99 2CE8 I          JSR      P1P2
2934 0F9A 0200 A          RTS
2935 0F9B      ;
2936 0F9B 907C B          LD      R0,EXPREL      ;EXPRESSION RELOCATION MODE
2937 0F9C 1503 A          BOC      NZ,$DEF
2938 0F9D      ;
2939 0F9D 4C2A A          LI      R0,42;     UNDEFINED ERROR      ;UNDEFINED ARG. E
2940 0F9E 2CAA I          JSR      ERROR
2941 0F9F 0200 A          RTS
2942 0FA0      ;
2943 0FA0 F026 B  $DEF:  SKNE     R0,K1
2944 0FA1 2107 A          JMP      $ABS
2945 0FA2 F040 B          SKNE     R0,K2
2946 0FA3 2166 A          JMP      $BSECT
2947 0FA4 F027 B          SKNE     R0,K3
2948 0FA5 2134 A          JMP      $TSECT
2949 0FA6 F02C B          SKNE     R0,K4
2950 0FA7 2162 A          JMP      $EXT
2951 0FA8 0000 A          HALT      ;MY ERROR - REL MODE NOT 0 TO 4
2952 0FA9      ;
2953 0FA9      ;
2954 0FA9 2C0E I  $ABS:  JSR      GNVC
2955 0FAA 2103 A          JMP      .+4
2956 0FAB 7C5E B          DSZ      INPTR
2957 0FAC F046 B          SKNE     R0,LPAREN
2958 0FAD 2106 A          JMP      $ABS1
2959 0FAE 807A B          LD      R0,EXPVAL
2960 0FAF 1201 A          BOC      P, .+2
2961 0FB0 2108 A          JMP      $2
2962 0FB1 E024 B          SKG      R0,K255
2963 0FB2 210A A          JMP      $3
2964 0FB3 2105 A          JMP      $2
2965 0FB4 807A B  $ABS1: LD      R0,EXPVAL      ;EXPRESSION VALUE

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2966 0FB5 E15E A      SKG      R0,KM129
2967 0FB6 2102 A      JMP      $2
2968 0FB7 E03A B      SKG      R0,HEX7F
2969 0FB8 2104 A      JMP      $3
2970 0FB9 295B A $2:   JSR      SPADR      ;SECIAL ADR-RELATIVE TO PC OK?
2971 0FBA 2122 A      JMP      STRYI     ;NO - TRY INDIRECT
2972 0FBB 0200 A      RTS              ;YES
2973 0FBC          ;      ADDRESS OK
2974 0FBC 807A B $ADROK: LD      R0,EXPVAL ;EXPRESSION VALUE
2975 0FBD 6024 B $3:   AND      R0,K255
2976 0FBE C072 B      ADD      R0,IVAL
2977 0FBF A072 B      ST       R0,IVAL
2978 0FC0 8150 A      LD       R0,$XFLAG
2979 0FC1 1501 A      BOC      NZ,$XOK   ;INDEXING OK
2980 0FC2 0200 A      RTS
2981 0FC3          ;      INDEXING OK
2982 0FC3 2C9E I $XOK: JSR      GNVC
2983 0FC4 0200 A      RTS
2984 0FC5 F046 B      SKNE     R0,LPAREN
2985 0FC6 2102 A      JMP      $LP
2986 0FC7 7C5E B      DSZ      INPTR    ;INPUT CHAR PTR
2987 0FC8 0200 A      RTS
2988 0FC9          ;
2989 0FC9          ;      LEFT PAREN
2990 0FC9 2971 A $LP:   JSR      EXPP2
2991 0FCA 2109 A      JMP      $VERR    ;INDEX VALUE ERROR
2992 0FCB 1401 A      BOC      B1E01,.,+2
2993 0FCC 2107 A      JMP      $VERR
2994 0FCD 5C08 A      SHL      R0,8
2995 0FCE C072 B      ADD      R0,IVAL
2996 0FCF A072 B      ST       R0,IVAL  ;SET INDEX FIELD
2997 0FD0 2C9E I      JSR      GNVC
2998 0FD1 2102 A      JMP      $VERR
2999 0FD2 F043 B      SKNE     R0,RPAREN
3000 0FD3 0200 A      RTS
3001 0FD4          ;
3002 0FD4          ;
3003 0FD4 4C06 A $VERR: LI      R0,6;      VALUE ERROR      ;VALUE ERROR
3004 0FD5 2CAA I      JSR      ERROR
3005 0FD6 4D01 A SERET: LI      R1,1
3006 0FD7 A47C B      ST       R1,EXPREL ;EXPRESSION RELOCATION MODE
3007 0FD8 B4FE I      ST       R1,IREL
3008 0FD9 0200 A      RTS
3009 0FDA          ;
3010 0FDA          ;      EXP REL = TSECT
3011 0FDA 806B B $TSECT: LD      R0,SECT
3012 0FDB F027 B      SKNE     R0,K3      ;SECT = TSECT?
3013 0FDC 21DC A      JMP      $2        ;YES
3014 0FDD          ;      TRY INDIRECT
3015 0FDD 8132 A $TRYI: LD      R0,$IFLAG
3016 0FDE 1506 A      BOC      NZ,$IOK    ;INDIRECT OK
3017 0FDF          ;      INDIRECT NOT OK
3018 0FDF 4C0C A $AERR: LI      R0,12;     ADDRESS ERROR
3019 0FE0 2CAA I      JSR      ERROR      ;ADDRESSING ERROR
3020 0FE1 21F4 A      JMP      SERET     ;ERROR RETURN
3021 0FE2          ;
3022 0FE2 4C00 A $MERR: LI      R0,0;      MISSING ARG. ERROR
3023 0FE3 2CAA I      JSR      ERROR
3024 0FE4 0200 A      RTS
3025 0FE5          ;
3026 0FE5          ;      INDIRECT OK - GENERATE INDIRECT WORD
3027 0FE5          ;      GENERATE POINTER
3028 0FE5          ;      $IOK:

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3029 0FE5 8072 B      LD      R0,IVAL
3030 0FE6 C129 A      ADD      R0,$IFLAG
3031 0FE7 A072 B      ST       R0,IVAL
3032 0FE8 8145 A      LD       R0,$CI
3033 0FE9 B0AE I      ST       R0,RELTB+3      ;REPLACE B WITH I IN REL TABLE
3034 0FEA 2CE8 I      JSR      P1P2
3035 0FEB 2117 A      JMP      $IOK1      ;PASS1
3036 0FEC 8D25 A      LD       R3,PTABF
3037 0FED 847C B      LD       R1,EXPREL      ;EXPRESSION RELOCATION MODE
3038 0FEE          ;      TOP OF LOOP
3039 0FEE 8B01 A $IOK5: LD       R2,1(R3)
3040 0FEF 8300 A      LD       R0,0(R3)
3041 0FF0 1108 A      BOC      Z,$IOK2      ;ADD NEW ENTRY
3042 0FF1 3482 A      RXOR     R1,R0
3043 0FF2 1502 A      BOC      NZ,$IOK3      ;NEXT
3044 0FF3 F87A B      SKNE     R2,EXPVAL      ;EXPRESSION VALUE
3045 0FF4 2109 A      JMP      $IOK4      ;FOUND
3046 0FF5          ;      NEXT3ENTRY
3047 0FF5          $IOK3:
3048 0FF5 4B02 A      AISZ     R3,2
3049 0FF6 FD1C A      SKNE     R3,PTABL
3050 0FF7 210F A      JMP      $IOK6      ;TABLE3OVERFLOW
3051 0FF8 21F5 A      JMP      $IOK5      ;GOTO3TOP3OF3LOOP
3052 0FF9          ;      ADD3NEW3ENTRY
3053 0FF9 A700 A $IOK2: ST       R1,0(R3)
3054 0FFA 807A B      LD       R0,EXPVAL      ;EXPRESSION VALUE
3055 0FFB A301 A      ST       R0,1(R3)
3056 0FFC 4C00 A      LI       R0,0
3057 0FFD A302 A      ST       R0,2(R3)
3058 0FFE          ;      ENTRY3FOUND
3059 0FFE DD13 A $IOK4: SUB      R3,PTABF
3060 0FFF 5FFF A      SHR      R3,1
3061 1000 CC5A B      ADD      R3,BMAX
3062 1001 CC72 B      ADD      R3,IVAL
3063 1002 AC72 B      ST       R3,IVAL
3064 1003          ;      RETURN
3065 1003 4D02 A $IOK1: LI       R1,2
3066 1004 A47C B      ST       R1,EXPREL      ;EXPRESSION RELOCATION MODE
3067 1005 B4FE I      ST       R1,IREL
3068 1006 0200 A      RTS
3069 1007          ;      TABLE3OVERFLOW
3070 1007 4C24 A $IOK6: LI       R0,36;      ERROR TABLE OVERFLOW
3071 1008 2CAA I      JSR      ERROR
3072 1009 21F9 A      JMP      $IOK1      ;RETURN
3073 100A          ;      END OF POINTER GENERATION
3074 100A          ;
3075 100A          ;
3076 100A          ;      EXP REL = EXTERNAL
3077 100A          $EXT:
3078 100A          ;
3079 100A          ;      EXP REL = BSECT
3080 100A 807A B $BSECT: LD      R0,EXPVAL      ;EXPRESSION VALUE
3081 100B 1201 A      BOC      P,$10
3082 100C 21D2 A      JMP      $AERR
3083 100D E024 B $10:  SKG      R0,K255
3084 100E 21AD A      JMP      $ADROK      ;OK - ADR IN RANGE 0 TO 255
3085 100F 21CF A      JMP      $AERR
3086 1010          ;
3087 1010 1011 A $IFLAG: .=.+1      ;INDIRECT FLAG - 0=NOT ALLOWED
3088 1011 1012 A $XFLAG: .=.+1      ;INDEX FLAG - 0=NOT ALLOWED
3089 1012 156C A PTABF: .WORD      PTRTAB
3090 1013 1698 A PTABL: .WORD      PTREND-1
3091 1014 FF7F A KM129: .WORD      -129

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3092 1015      ;
3093 1015      ;
3094 1015      ;      SPECIAL ADR ?      JSR  SPADR
3095 1015      ;                      NO
3096 1015      ;                      YES
3097 1015 2C9E I SPADR: JSR      GNVC
3098 1016 2103 A      JMP      $50
3099 1017 7C5E B      DSZ      INPTR      ;INPUT CHAR PTR
3100 1018 F046 B      SKNE     R0,LPAREN
3101 1019 0200 A      RTS
3102 101A 806B B $50:  LD      R0,SECT
3103 101B F07C B      SKNE     R0,EXPREL      ;EXPRESSION RELOCATION MODE
3104 101C 2101 A      JMP      $51
3105 101D 0200 A      RTS
3106 101E 807A B $51:  LD      R0,EXPVAL      ;EXPRESSION VALUE
3107 101F D05C B      SUB      R0,LOCCTR
3108 1020 D026 B      SUB      R0,K1
3109 1021 E1F2 A      SKG      R0,KM129      ; -129
3110 1022 0200 A      RTS
3111 1023 E03A B      SKG      R0,HEX7F
3112 1024 2101 A      JMP      $52
3113 1025 0200 A      RTS
3114 1026 6024 B $52:  AND      R0,K255
3115 1027 C03F B      ADD      R0,K256
3116 1028 C072 B      ADD      R0,IVAL
3117 1029 A072 B      ST       R0,IVAL
3118 102A 4D01 A      LI       R1,1
3119 102B A47C B      ST       R1,EXPREL      ;EXPRESSION RELOCATION MODE
3120 102C B4FE I      ST       R1,IREL
3121 102D 0201 A      RTS      1
3122 102E      ;
3123 102E 2049 A $CI:  .WORD   ' I '

3124 102F      .PAGE   'SPECIAL EXPRESSION REQUESTS'
3125 102F      .LOCAL
3126 102F      ;
3127 102F      ;
3128 102F      ;
3129 102F 4C00 A EXPABS: LI      R0,0
3130 1030      $4:
3131 1030 4D01 A      LI       R1,1      ;POS/NEG OK
3132 1031 2112 A      JMP      $EXPN
3133 1032      ;
3134 1032 8030 B EXPP:  LD      R0,X8000
3135 1033 4D00 A $5:  LI       R1,0      ;POS ONLY
3136 1034 210F A      JMP      $EXPN
3137 1035      ;
3138 1035 802E B EXP4:  LD      R0,XFFF0      ;0FFF0
3139 1036 21F9 A      JMP      $4
3140 1037      ;
3141 1037 8042 B EXP8:  LD      R0,XFF00
3142 1038 21F7 A      JMP      $4
3143 1039      ;
3144 1039 4CFE A EXPP1: LI      R0,-2
3145 103A 21F8 A      JMP      $5
3146 103B      ;
3147 103B 4CFC A EXPP2: LI      R0,-4
3148 103C 21F6 A      JMP      $5
3149 103D      ;
3150 103D 4CF8 A EXPP3: LI      R0,-8
3151 103E 21F4 A      JMP      $5
3152 103F      ;

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3153 103F 4CF0 A EXPP4: LI      R0,-16
3154 1040 21F2 A      JMP      $5
3155 1041      ;
3156 1041 4C80 A EXPP7: LI      R0,-128
3157 1042 21F0 A      JMP      $5
3158 1043      ;
3159 1043      ;      EXP WITH MASK IN R0 (USED BY FORM DIRECTIVE)
3160 1043 4D01 A EXPFRM: LI      R1,1
3161 1044      ;
3162 1044      ;      MASK IN R0, FLAG IN R1 (0=POS)
3163 1044      ;
3164 1044 A11E A $EXPN: ST      R0,$MASK
3165 1045 A51E A      ST      R1,$FLAG      ;0=POS
3166 1046 2CB9 I      JSR      EXP
3167 1047 0200 A      RTS      0      ;NO EXP
3168 1048 947C B      LD      R1,EXPREL      ;EXPRESSION RELOCATION MODE
3169 1049 E426 B      SKG      R1,K1
3170 104A 2109 A      JMP      $1      ;ABS OR UNDEF
3171 104B      ;      ERROR - SIZE
3172 104B 4C06 A $2:  LI      R0,6;      VALUE ERROR
3173 104C 2CAA I      JSR      ERROR
3174 104D 4C00 A      LI      R0,0
3175 104E 4E01 A      LI      R2,1

3176 104F A07A B      ST      R0,EXPVAL      ;EXPRESSION VALUE
3177 1050 A87B B      ST      R2,EXPPD      ;PREV.DEF. 1=YES
3178 1051 A97C B      ST      R0,EXPREL      ;EXPRESSION RELOCATION MODE
3179 1052 847C B      LD      R1,EXPREL      ;EXPRESSION RELOCATION MODE
3180 1053 0201 A      RTS      1
3181 1054      ;
3182 1054 850E A $1:  LD      R1,$MASK
3183 1055 3483 A      RAND      R1,R0
3184 1056 1106 A      BOC      Z,$3      ;OK
3185 1057 810C A      LD      R0,$FLAG
3186 1058 11F2 A      BOC      Z,$2      ;ERROR - WE NEED POSITIVE
3187 1059      ;      NEGATIVE OK
3188 1059 807A B      LD      R0,EXPVAL      ;EXPRESSION VALUE
3189 105A 3483 A      RAND      R1,R0
3190 105B 3482 A      RXOR      R1,R0
3191 105C 15EE A      BOC      NZ,$2      ;ERROR
3192 105D      ;      VALUE OK
3193 105D 8105 A $3:  LD      R0,$MASK
3194 105E 5000 A      CAI      R0,0
3195 105F 607A B      AND      R0,EXPVAL      ;EXPRESSION VALUE
3196 1060 847C B      LD      R1,EXPREL      ;EXPRESSION RELOCATION MODE
3197 1061 887B B      LD      R2,EXPPD      ;PREV.DEF. 1=YES
3198 1062 0201 A      RTS      1
3199 1063      ;
3200 1063 1064 A $MASK:  .=.+1
3201 1064 1065 A $FLAG:  .=.+1      ; 0=POS  NZ=POS/NEG

3202 1065      .PAGE      'OUTPUT DATA WORD TO LIST AND BINARY'
3203 1065      .LOCAL
3204 1065      ;
3205 1065 A12B A OUTWRD: ST      R0,$WRD      JSR OUTWRD
3206 1066 A52B A      ST      R1,$REL
3207 1067 805D B      LD      R0,PASS
3208 1068 1301 A      BOC      ODD,.+2
3209 1069 2116 A      JMP      $3
3210 106A 806A B      LD      R0,MOFLAG      ;MULTIPLE OUTPUT FLAG 0=1ST  NZ=SUBSE?
3211 106B 1106 A      BOC      Z,$1
3212 106C 7C71 B      DSZ      PGRL      ;PAGE REMAINING LINES

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3213 106D 2102 A      JMP      .+3
3214 106E 4F07 A      LI       R3,7
3215 106F 2CDF I      JSR      OPGSTR      ;OUTPUT PAGE STRING
3216 1070 2972 A      JSR      NEWLIN
3217 1071 2943 A      JSR      O6B
3218 1072 805C B $1:   LD       R0,LOCCTR
3219 1073 2931 A      JSR      OHEX
3220 1074 2944 A      JSR      O1B
3221 1075 811B A      LD       R0,$WRD
3222 1076 292E A      JSR      OHEX
3223 1077 8D1A A      LD       R3,$REL
3224 1078 EC2C B      SKG       R3,K4
3225 1079 2101 A      JMP      .+2
3226 107A DC2C B      SUB      R3,K4
3227 107B CD0C A      ADD      R3,$RELTB
3228 107C 8300 A      LD       R0,0(R3)
3229 107D 2966 A      JSR      O2CH
3230 107E 293A A      JSR      O1B
3231 107F 2CFF I      JSR      OIBUF      ;OUTPUT INPUT BUFFER
3232 1080 785C B $3:   ISZ      LOCCTR
3233 1081 3081 A      NOP
3234 1082 810E A      LD       R0,$WRD
3235 1083 890E A      LD       R2,$REL
3236 1084 2D02 A      JSR      @$LOOWRD      ;OUTPUT OBJECT WORD
3237 1085 3081 A      NOP
3238 1086 0200 A      RTS
3239 1087 1294 A $LOOWRD: .WORD      OOWORD
3240 1088      ;
3241 1089      ;
3242 1088      RELTB:
3243 1088 1089 A $RELTB: .WORD      .+1
3244 1089 2055 A      .ASCII      ' U A B T XGAGBGT '
      108A 2041 A
      108B 2042 A
      108C 2054 A
      108D 2058 A
      108E 4741 A
      108F 4742 A
      1090 4754 A
3245 1091 1092 A $WRD:   .+.+1
3246 1092 1093 A $REL:   .+.+1
3247 1093      ;
3248 1093      ;      OUTPUT VALUE FROM ASSIGN OR END DIRECTIVES
3249 1093      ;
3250 1093 2909 A OVAL:   JSR      OHEXIF
3251 1094 805D B      LD       R0,PASS
3252 1095 1301 A      BOC      ODD,+.2
3253 1096 0200 A      RTS
3254 1097 8089 B      LD       R0,INDEV      ;INPUT DEVICE 0=CR,1=KB,2=PT
3255 1098 13FD A      BOC      ODD,.-2
3256 1099 291D A      JSR      O2B
3257 109A 291E A      JSR      O1B
3258 109B 2CFF I      JSR      OIBUF
3259 109C 0200 A      RTS
3260 109D      ;
3261 109D      ;      OUTPUT HEX IF PASS2 ELSE IGNORE
3262 109D      ;
3263 109D 4000 A OHEXIF: PUSH      R0
3264 109E 805D B      LD       R0,PASS
3265 109F 1302 A      BOC      ODD,+.3
3266 10A0 4400 A      PULL      R0
3267 10A1 0200 A      RTS
3268 10A2 2913 A      JSR      O4B

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3269 10A3 2915 A      JSR      01B
3270 10A4 4400 A      PULL     R0
3271 10A5              ;
3272 10A5              ;      OUTPUT 4 HEX DIGITS      JSR      OHEX
3273 10A5              ;
3274 10A5 2903 A OHEX: JSR      $01X1
3275 10A6 2901 A      JSR      $01X
3276 10A7 2900 A      JSR      $01X
3277 10A8              ;
3278 10A8 810A A $01X: LD      R0,$TEMP
3279 10A9 5804 A $01X1: ROL     R0,4
3280 10AA A108 A      ST      R0,$TEMP
3281 10AB 602D B      AND     R0,K15
3282 10AC E02B B      SKG     R0,K9
3283 10AD 2103 A      JMP     $01X2
3284 10AE C039 B      ADD     R0,HEX37
3285 10AF 290A A $01X3: JSR      01CH
3286 10B0 0200 A      RTS
3287 10B1              ;
3288 10B1 C038 B $01X2: ADD     R0,HEX30
3289 10B2 21FC A      JMP     $01X3
3290 10B3              ;
3291 10B3 10B4 A $TEMP: .=.+1                      ;TEMP
3292 10B4 0D0A A HEXD0A: .WORD 0D0A
3293 10B5              ;
3294 10B5              ;      OUTPUT 6 /4 BLANKS
3295 10B5              ;
3296 10B5 2901 A O6B:  JSR      02B
3297 10B6 2900 A O4B:  JSR      02B
3298 10B7              ;
3299 10B7              ;      OUTPUT 2 BLANKS,1 BLANK OR 1 CHAR
3300 10B7              ;
3301 10B7 4C20 A O2B:  LI      R0,' '/256          ;OUTPUT 2 BLANKS
3302 10B8 2901 A      JSR      01CH
3303 10B9 4C20 A O1B:  LI      R0,' '/256          ;OUTPUT 1 BLANK
3304 10BA              ;
3305 10BA              ;      PUT CHAR OUT IF IN LIST MODE
3306 10BA              ;
3307 10BA 4000 A O1CH: PUSH     R0
3308 10BB 800C A      LD      R0,PNCHMD
3309 10BC 1506 A      BOC     NZ,$PUT3
3310 10BD 805D B      LD      R0,PASS
3311 10BE 1306 A      BOC     ODD,$PUT2
3312 10BF 8097 B $PUT1: LD      R0,TYPMOD
3313 10C0 1502 A      BOC     NZ,+.3
3314 10C1 4400 A      PULL     R0
3315 10C2 241A B      JMP     @HSPRT
3316 10C3 4400 A $PUT3: PULL     R0
3317 10C4 2410 B      JMP     @PUTC
3318 10C5 808E B $PUT2: LD      R0,LISTMD
3319 10C6 15F8 A      BOC     NZ,$PUT1
3320 10C7 808B B      LD      R0,ERRPT
3321 10C8 F055 B      SKNE    R0,ERRBAS
3322 10C9 2101 A      JMP     .+2
3323 10CQ 21F4 A      JMP     $PUT1
3324 10CB 4400 A      PULL     R0
3325 10CC 0200 A      RTS
3326 10CD              ;
3327 10CD              ;
3328 10CD 806A B O12B: LD      R0,MOFLAG
3329 10CE 1502 A      BOC     NZ,$RET
3330 10CF 29E5 A      JSR      06B
3331 10D0 29E4 A      JSR      06B

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3332 10D1 0200 A $RET:   RTS
3333 10D2          ;
3334 10D2          ;      OUTPUT N CR AND LF WHERE N IS IN R3
3335 10D2          ;
3336 10D2 EC3B B  MANYNL: SKG      R3,HEX3F
3337 10D3 FC23 B      SKNE      R3,ZERO
3338 10D4 0200 A      RTS
3339 10D5 8096 B      LD        R0,HSPR
3340 10D6 1509 A      BOC        NZ,$MAN1
3341 10D7 EC71 B      SKG      R3,PGRL
3342 10D8 2106 A      JMP        $MAN1
3343 10D9 8091 B      LD        R0,NOLIST
3344 10DA 1104 A      BOC        Z,$MAN1
3345 10DB 4C0D A      LI        R0,0D
3346 10DC 2C1A B      JSR      @HSPRT
3347 10DD 4C0C A      LI        R0,0C
3348 10DE 241A B      JMP        @HSPRT
3349 10DF          $MAN1:
3350 10DF 2903 A      JSR      NEWLIN
3351 10E0 4BFF A      AISZ      R3,-1
3352 10E1 21FD A      JMP      .-2
3353 10E2 0200 A      RTS
3354 10E3          ;
3355 10E3          ;      OUTPUT CR AND LF      OUTPUT 2 CHARS
3356 10E3          ;
3357 10E3 81D0 A  NEWLIN: LD        R0,HEXD0A
3358 10E4          ;
3359 10E4 A1CE A  O2CH:  ST        R0,$TEMP
3360 10E5 5CF8 A      SHR      R0,R
3361 10E6 29D3 A      JSR      O1CH
3362 10E7 81CB A      LD        R0,$TEMP
3363 10E8 6024 B      AND      R0,K255
3364 10E9 21D0 A      JMP      O1CH      ;OUT CHAR AND RETURN
3365 10EA          ;
3366 10EA          ;      OUTPUT NEW LINE AND MESSAGE
3367 10EA          ;      R3 POINTS TO MESSAGE      0 WORD ENDS MESSAGE
3368 10EA          ;
3369 10EA 29F8 A  ONLMSG: JSR      NEWLIN
3370 10EB 8300 A  OMSG:  LD        R0,0(R3)
3371 10EC 11E4 A      BOC        Z,$RET
3372 10ED 5C01 A      SHL      R0,1
3373 10EE 5CFF A      SHR      R0,1
3374 10EF 29F4 A      JSR      O2CH
3375 10F0 8300 A      LD        R0,0(R3)
3376 10F1 1201 A      BOC        P,+.2
3377 10F2 0200 A      RTS      ;LAST WORD NEG.
3378 10F3 4B01 A      AISZ      R3,1
3379 10F4 21F6 A      JMP      OMSG
3380 10F5 0200 A      RTS
3381 10F6          ;
3382 10F6          ;
3383 10F6          ;
3384 10F6          ;      OUTPUT PAGE STRING
3385 10F6          ;
3386 10F6 29DB A  OPGSTR: JSR      MANYNL
3387 10F7 4C37 A      LI        R0,55
3388 10F8 A071 B      ST        R0,PGRL
3389 10F9 8D06 A      LD        R3,SEQTTL
3390 10FA 29EF A      JSR      ONLMSG
3391 10FB 8D03 A      LD        R3,$EQPG      ;=PGSTRG
3392 10FC 29ED A      JSR      ONLMSG
3393 10FD 4F02 A      LI        R3,2
3394 10FE 21D3 A      JMP      MANYNL

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3395 10FF      ;
3396 10FF 06F0 A SEQPG: .WORD   PGSTRG
3397 1100 071D A SEQTTL: .WORD   TTLBUF+4

3398 1101      .PAGE   'REPORT ERRORS'
3399 1101      .LOCAL
3400 1101      ;
3401 1101      ;      CHECK EXCESS ARGUMENTS
3402 1101      ;
3403 1101      XARGCK:
3404 1101 2C9E I      JSR      GNVC
3405 1102 0200 A      RTS
3406 1103 808B B      LD      R0,ERRPT
3407 1104 D055 B      SUB      R0,ERRBAS
3408 1105 1502 A      BOC      NZ,+.3
3409 1106 4C1E A      LI      R0,30;      EXCESS ARGUMENTS ERROR
3410 1107 2CAA I      JSR ERROR
3411 1108 0200 A      RTS
3412 1109 125A A PR2PTR: .WORD   PRMPT2
3413 110A      ;
3414 110A      ;      OUTPUT INPUT BUFFER AND REPORT ERRORS
3415 110A      ;
3416 110A      OIBREP:
3417 110A 8096 B      LD      R0,HSPR
3418 110B A097 B      ST      R0,TYPMOD
3419 110C 805D B      LD      R0,PASS
3420 110D 1301 A      BOC      ODD,+.2
3421 110E 0200 A      RTS
3422 110F 8089 B      LD      R0,INDEV      ;INPUT DEVICE  0=CR,1=KB,2=PT
3423 1110 1303 A      BOC      ODD,+.4
3424 1111 2DF7 A      JSR      @PR2PTR
3425 1112 29BA A      JSR      O12B
3426 1113 297A A      JSR      OIBUF      ;OUTPUT INPUT BUFFER IF NOT YET OUT
3427 1114      REPERR:
3428 1114 8096 B      LD      R0,HSPR
3429 1115 A097 B      ST      R0,TYPMOD
3430 1116      ;
3431 1116      ;      ANY ERRORS TO REPORT
3432 1116      ;
3433 1116      $102:
3434 1116 808B B      LD      R0,ERRPT
3435 1117 F055 B      SKNE     R0,ERRBAS
3436 1118 0200 A      RTS
3437 1119 805D B      LD      R0,PASS
3438 111A 1301 A      BOC      ODD,+.2
3439 111B 0200 A      RTS
3440 111C      ;      INCREMENT ERROR COUNT
3441 111C 7898 B      ISZ      EC
3442 111D 4EFC A      LI      R2,-4
3443 111E 8488 B      LD      R1,EC
3444 111F 3481 A $103: RCPY     R1,R0
3445 1120 502D B      AND      R0,K15
3446 1121 1501 A      BOC      NZ,+.2
3447 1122 C423 B      ADD      R1,K6
3448 1123 5904 A      ROL      R1,4
3449 1124 4A01 A      AISZ     R2,1
3450 1125 21F9 A      JMP      $103
3451 1126 A488 B      ST      R1,EC
3452 1127      ;
3453 1127      ;      OUTPUT ERROR MESSAGE
3454 1127      ;
3455 1127 8855 B      LD      R2,ERRBAS

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3456 1128 A922 A      ST      R2,$TMP
3457 1129 8921 A $100: LD      R2,$TMP
3458 112A F88B B      SKNE    R2,ERRPT
3459 112B 211C A      JMP     $104
3460 112C 7C71 B      DSZ     PGRL          ;PAGE REMAINING LINES
3461 112D 3081 A      NOP
3462 112E 8071 B      LD      R0,PGRL
3463 112F 1B01 A      BOC     LEZ,+.2
3464 1130 2102 A      JMP     .+3
3465 1131 4F07 A      LI      R3,7
3466 1132 29C3 A      JSR     OPGSTR          ;OUTPUT PAGE STRING
3467 1133 8D18 A      LD      R3,ERRMSG
3468 1134 29B5 A      JSR     ONLMSG          ;OUTPUT NEW LINE AND MESSAGE
3469 1135 8915 A      LD      R2,$TMP
3470 1136 8E00 A      LD      R3,0(R2)
3471 1137 CD19 A      ADD     R3,MSGTAB
3472 1138 29B2 A      JSR     OMSG
3473 1139 8911 A      LD      R2,$TMP
3474 113A      ;      OUTPUT CHAR PTR
3475 113A 8E09 A      LD      R3,ELIM+1(R2)
3476 113B EC39 B      SKG     R3,HEX37
3477 113C 2101 A      JMP     .+2
3478 113D 2108 A      JMP     $200
3479 113E 2CF0 I      JSR     O1B
3480 113F 4BFF A      AISZ    R3,-1
3481 1140 21FD A      JMP     .-2
3482 1141 4C40 A      LI      R0,'0'/256
3483 1142 2CEE I      JSR     O1CH
3484 1143 908E B      LD      R0,LISTMD
3485 1144 1501 A      BOC     NZ,+.2
3486 1145 299D A      JSR     NEWLIN
3487 1146 7904 A $200: ISZ     $TMP
3488 1147 21E1 A      JMP     $100
3489 1148 8055 B $104: LD      R0,ERRBAS
3490 1149 A08B B      ST      R0,ERRPT
3491 114A 0200 A      RTS
3492 114B      ;
3493 114B 114C A $TMP:  .=.+1
3494 114C 114D A ERRMSG: .WORD  .+1
3495 114D 4552 A      .ASCII  'ERROR'
3496 1150 0000 A      .WORD  0
3497 1151 1152 A MSGTAB: .WORD  .+1
3498 1152 4D49 A      .ASCII  'MISSING AR'
3499 1157 C72E A      .WORD  'G.'+S
3500 1158 5641 A      .ASCII  'VALUE'
3501 115D A020 A      .WORD  0A020
3502 115E 4144 A      .ASCII  'ADDRESS'
3503 1163 A020 A      .WORD  0A020
3504 1164 5553 A      .ASCII  'USAGE'

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1165 4147 A
1166 4520 A
1167 2020 A
1168 2020 A
3505 1169 A020 A      .WORD    0A020
3506 116A 5359 A      .ASCII    'SYNTAX'
116B 4E54 A
116C 4158 A
116D 2020 A
116E 2020 A
3507 116F A020 A      .WORD    0A020
3508 1170 4558 A      .ASCII    'EXCESS ARG'
1171 4345 A
1172 5353 A
1173 2041 A
1174 5247 A
3509 1175 AE20 A      .WORD    '.'+S
3510 1176 5442 A      .ASCII    'TBL OVERFL'
1177 4C20 A
1178 4F56 A
1179 4552 A
117A 464C A
3511 117B CF57 A      .WORD    'OW'+S
3512 117C 554E A      .ASCII    'UNDEFINED'
117D 4445 A
117E 4649 A
117F 4E45 A
1180 4420 A
3513 1181 A020 A      .WORD    0A020
3514 1182 4455 A      .ASCII    'DUP. DEF.'
1183 502E A
1184 2044 A
1185 4546 A
1186 2E20 A
3515 1187 A020 A      .WORD    0A020
3516 1188 4558 A      .ASCII    'EXTD. INST'
1189 5444 A
118A 2E20 A
118B 494E A
118C 5354 A
3517 118D AE20 A      .WORD    '.'+S

3518 118E      .PAGE    'OUTPUT INPUT BUFFER'
3519 118E      .LOCAL
3520 118E      ;
3521 118E 806A B OIBUF: LD      R0,MOFLAG      JSR OIBUF
3522 118F 1101 A      BOC      Z,$1
3523 1190 0200 A      RTS
3524 1191 805D B $1:  LD      R0,PASS
3525 1192 1301 A      BOC      ODD,+.2
3526 1193 2122 A      JMP      $2
3527 1194      .IF      SIZE8
3528 1194 8020 B      LD      R0,DSKTMP
3529 1195 1202 A      BOC      P,$8
3530 1196      .ENDIF
3531 1196 8089 B      LD      R0,INDEV      ;INPUT DEVICE 0=CR,1=KB,2=PT
3532 1197 131E A      BOC      ODD,$2
3533 1198      ;
3534 1198 8012 B $8:  NOT KB INPUT AND IS PASS2
3535 1199 A11F A      LD      R0,INBUFB
3536 119A 2CF0 I      ST      R0,$IPTR
3537 119B 8D1D A $5:  JSR      O1B
                        LD      R3,$IPTR

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3538 119C ED1D A      SKG      R3,$IBEND
3539 119D 2101 A      JMP      $3
3540 119E 2117 A      JMP      $2                      ;FINISHED
3541 119F          ;
3542 119F 8300 A $3:   LD        R0,0(R3)
3543 11A0 F034 B      SKNE     R0,BLANK
3544 11A1 2107 A      JMP      $4
3545 11A2 F047 B $7:   SKNE     R0,CR
3546 11A3 2112 A      JMP      $2
3547 11A4 F092 B      SKNE     R0,NOCOM          ;NO COMMENT TEST (';' IF NO COMMENTS)
3548 11A5 2110 A      JMP      $2
3549 11A6 2CEE I      JSR      O1CH
3550 11A7 7911 A      ISZ      $IPTR
3551 11A8 21F2 A      JMP      $5
3552 11A9 4B01 A $4:   AISZ     R3,1
3553 11AA ED0F A      SKG      R3,$IBEND
3554 11AB 2101 A      JMP      $6
3555 11AC 2109 A      JMP      $2                      ;FINISHED
3556 11AD          ;
3557 11AD 8300 A $6:   LD        R0,0(R3)
3558 11AE F034 B      SKNE     R0,BLANK
3559 11AF 21F9 A      JMP      $4
3560 11B0 F092 B      SKNE     R0,NOCOM          ;NO COMMENT TEST (';' IF NO COMMENTS)
3561 11B1 2104 A      JMP      $2
3562 11B2 F047 B      SKNE     R0,CR
3563 11B3 2102 A      JMP      $2
3564 11B4 9104 A      LD        R0,@$IPTR
3565 11B5 21EC A      JMP      $7
3566 11B6          ;
3567 11B6          $2:   FINISHED OUTPUT OF INPUT BUFFER
3568 11B6 4C0D A      LI        R0,0D
3569 11B7 A06A B      ST        R0,MOFLAG          ;SET MOFLAG      NZ=SOURCE ALREADY OUTPUT
3570 11B8 0200 A      RTS
3571 11B9 11BA A $IPTR:  .=.+1
3572 11BA 06D4 A $IBEND: .WORD      INBUF+52

3573 11BB          .PAGE      'INPUT ROUTINES'
3574 11BB          .LOCAL
3575 11BB          READ:
3576 11BB 8012 B      LD        R0,INBUFB
3577 11BC A05E B      ST        R0,INPTR          ;INPUT CHAR PTR
3578 11BD A05F B      ST        R0,LCPTR
3579 11BE 805D B      LD        R0,PASS
3580 11BF 1307 A      BOC       ODD,$PRM
3581 11C0          .IF        SIZE3
3582 11C0 1403 A      BOC       BLEQ1,$60
3583 11C1          .ENDIF
3584 11C1          ; PASS=0
3585 11C1 8089 B $61:   LD        R0,INDEV
3586 11C2 1304 A      BOC       ODD,$PRM
3587 11C3 2109 A      JMP      $NOPRT
3588 11C4          .IF        SIZE4
3589 11C4          ; PASS=2
3590 11C4 8020 B $60:   LD        R0,DSKTMP
3591 11C5 1207 A      BOC       P,$NOPRT
3592 11C6 21FA A      JMP      $61
3593 11C7          .ENDIF
3594 11C7          ;
3595 11C7          ;
3596 11C7          ;
3597 11C7          ;
3598 11C7 789D B $PRM:  ISZ      LCNT2

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3599 11C8 2103 A      JMP      $50
3600 11C9 8031 B      LD        R0,X5656
3601 11CA A08D B      ST        R0,LCNT2
3602 11CB 798C B      ISZ      LCNT1
3603 11CC 2D2A A $50: JSR      @SPROMPT
3604 11CD              ;
3605 11CD              ;      FINISHED PRINTING LINE NUM AND PROMPT,NOW READ INPUT
3606 11CD              ;
3607 11CD              ;      SNOPRT:
3608 11CD              .IF      SIZE8
3609 11CD 801F B      LD        R0,DSKIN
3610 11CE 5000 A      CAI      R0,0
3611 11CF 1202 A      BOC      P,+.3
3612 11D0 2C18 B      JSR      @RDSKIN
3613 11D1 210D A      JMP      $10B
3614 11D2 805D B      LD        R0,PASS
3615 11D3 1102 A      BOC      Z,+.3
3616 11D4 8020 B      LD        R0,DSKTMP
3617 11D5 5000 A      CAI      R0,0
3618 11D6 1202 A      BOC      P,+.3
3619 11D7 2C19 B      JSR      @RDSKTM
3620 11D8 2106 A      JMP      $10B
3621 11D9 8089 B      LD        R0,INDEV      ;INPUT DEVICE 0=CR,1=KB,2=PT ;INPUT DE
3622 11DA 1502 A      BOC      NZ,$10      ;TTY
3623 11DB 2C11 B      JSR      @RDCRD
3624 11DC 2102 A      JMP      $10B
3625 11DD              .ENDIF
3626 11DD              ;      TTY INPUT
3627 11DD 291A A $10: JSR      RDTTY
3628 11DE 2114 A      JMP      $10A
3629 11DF              ;      COMPUTE SOURCE CHECKSUM
3630 11DF 805D B $10B: LD        R0,PASS
3631 11E0 1504 A      BOC      NZ,+.5
3632 11E1 8020 B      LD        R0,DSKTMP
3633 11E2 5000 A      CAI      R0,0
3634 11E3 1201 A      BOC      P,+.2
3635 11E4 2C16 B      JSR      @WDSKTM
3636 11E5 9012 B      LD        R0,@INBUFB
3637 11E6 F092 B      SKNE     R0,NOCOM
3638 11E7 21E5 A      JMP      SNOPRT
3639 11E8 4C0D A      LI        R0,0D
3640 11E9 94A7 I      LD        R1,SOUCK
3641 11EA 8C12 B      LD        R3,INBUFB
3642 11EB F300 A $11C: SKNE     R0,0(R3)
3643 11EC 0200 A      RTS
3644 11ED C700 A      ADD      R1,0(R3)
3645 11EE B4A7 I      ST        R1,SOUCK
3646 11EF 4B01 A      AISZ     R3,1
3647 11F0 FD5C A      SKNE     R3,SIBL
3648 11F1 0200 A      RTS
3649 11F2 21F8 A      JMP      $11C
3650 11F3              ;
3651 11F3              ;
3652 11F3 8089 B $10A: LD        R0,INDEV      ;INPUT DEVICE 0=CR,1=KB,2=PT
3653 11F4 1301 A      BOC      ODD,+.2
3654 11F5 21E7 A      JMP      $10
3655 11F6              ;      INPUT DEVICE IS KB,MUST REPROMPT
3656 11F6 21D5 A      JMP      $50
3657 11F7 1263 A $PROMPT: .WORD  PROMPT
3658 11F8              ;
3659 11F8              ;      READ TELETYPE
3660 11F8              ;
3661 11F8 4EB8 A RDTTY: LI        R2,-72

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3662 11F9 8C12 B      LD      R3,INBUFB
3663 11FA AC5E B      ST      R3,INPTR      ; INPUT CHAR PTR
3664 11FB 9099 B $12:  LD      R0,INDEV
3665 11FC 1302 A      BOC      ODD,$12B
3666 11FD 2C0F B $GC:  JSR      @GETC
3667 11FE 2104 A      JMP      $12A
3668 11FF 805D B $12B: LD      R0,PASS
3669 1200 D040 B      SUB      R0,K2
3670 1201 11FB A      BOC      Z,$GC
3671 1202 2C14 B      JSR      @ECHOGC
3672 1203 603A B $12A: AND      R0,HEX7F
3673 1204 11F6 A      BOC      Z,$12
3674 1205 F047 B      SKNE     R0,CR
3675 1206 210F A      JMP      $11B
3676 1207 F134 A      SKNE     R0,$LF
3677 1208 21F2 A      JMP      $12
3678 1209 F03A B      SKNE     R0,HEX7F      ; RUBOUT
3679 120A 21F0 A      JMP      $12
3680 120B F12E A      SKNE     R0,HEX5F      ; BACKSPACE ARROW
3681 120C 212A A      JMP      $BKSP
3682 120D F12D A      SKNE     R0,HEX7D      ; ALT KEY
3683 120E 0200 A      RTS
3684 120F F02B B      SKNE     R0,K9
3685 1210 210E A      JMP      $TAB
3686 1211 A300 A      ST      R0,0(R3)
3687 1212 4B01 A      AISZ     R3,1
3688 1213 4A01 A      AISZ     R2,1
3689 1214 21E6 A      JMP      $12
3690 1215 0201 A      RTS      1
3691 1216 A300 A $11B: ST      R0,0(R3)
3692 1217 8089 B      LD      R0,INDEV      ; INPUT DEVICE 0=CR,1=KB,2=PT
3693 1218 605D B      AND      R0,PASS
3694 1219 1301 A      BOC      ODD,++2
3695 121A 0201 A      RTS      1
3696 121B      ;      INPUT IS KB AND THIS IS PASS2 THEREFORE BACKUP CARRAGE
3697 121B 4C0D A      LI      R0,0D
3698 121C 2CEE I      JSR      01CH
3699 121D 2CD4 I      JSR      06B
3700 121E 0201 A      RTS      1
3701 121F      ;
3702 121F E914 A $TAB: SKG      R2,KM41
3703 1220 2101 A      JMP      .+2
3704 1221 21D9 A      JMP      $12      ; IGNORE IF > COL. 32
3705 1222 4D28 A      LI      R1,40
3706 1223 E911 A      SKG      R2,KM57
3707 1224 4D38 A      LI      R1,56
3708 1225 E910 A      SKG      R2,KM65
3709 1226 4D40 A      LI      R1,64
3710 1227 3900 A      RADD     R2,R1
3711 1228 8034 B $TAB1: LD      R0,BLANK
3712 1229 A300 A      ST      R0,0(R3)
3713 122A 8089 B      LD      R0,INDEV
3714 122B D040 B      SUB      R0,K2
3715 122C 1102 A      BOC      Z,++3
3716 122D 8034 B      LD      R0,BLANK
3717 122E 2C10 B      JSR      @PUTC
3718 122F 4B01 A      AISZ     R3,1
3719 1230 4A01 A      AISZ     R2,1
3720 1231 4901 A      AISZ     R1,1
3721 1232 21F5 A      JMP      $TAB1
3722 1233 21C7 A      JMP      $12
3723 1234 FFD7 A KM41: .WORD    -41
3724 1235 FFC7 A KM57: .WORD    -57

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3725 1236 FFBF A KM65: .WORD -65
3726 1237 ;
3727 1237 4BFF A $BKSP: AISZ R3,-1
3728 1238 4AFF A AISZ R2,-1
3729 1239 21C1 A JMP $12
3730 123A 005F A HEX5F: .WORD 05F
3731 123B 007D A HEX7D: .WORD 07D
3732 123C 000A A $LF: .WORD 0A
3733 123D 123E A LCNT2A: .+.1
3734 123E ;
3735 123E ; GET NEXT VALID CHAR
3736 123E ;
3737 123E ; JSR GNVC
3738 123E ; NONE
3739 123E ; CHAR. IN R0
3740 123E ;
3741 123E 4D01 A GNVC: LI R1,1
3742 123F 8C5E B $1: LD R3,INPTR ;INPUT CHAR PTR
3743 1240 FD0C A SKNE R3,$IBL ;INBUF LAST ADR + 1
3744 1241 0200 A RTS ;STAT. END
3745 1242 8300 A LD R0,0(R3) ;LOAD NEXT CHAR
3746 1243 F047 B SKNE R0,CR ;CHAR. RET. CHAR.
3747 1244 0200 A RTS
3748 1245 F049 B SKNE R0,SEMI ;SEMICOLAN
3749 1246 2109 A JMP $2
3750 1247 F034 B SKNE R0,BLANK
3751 1248 210A A JMP $3
3752 1249 SRETC:
3753 1249 785E B ISZ INPTR ;INPUT CHAR PTR
3754 124A 0201 A RTS 1
3755 124B ;
3756 124B ; GET NEXT CHAR - GNC 0 , GNVC 1 , GNCVC 2
3757 124B ;
3758 124B ; JSR GNC
3759 124B ; NONE
3760 124B ; CHAR IN R0
3761 124B ;
3762 124B 4D00 A GNC: LI R1,0
3763 124C 21F2 A JMP $1
3764 124D ;
3765 124D 06E8 A $IBL: .WORD INBUF+72
3766 124E ;
3767 124E 4D02 A GNCVC: LI R1,2
3768 124F 21EF A JMP $1
3769 1250 ; SEMICOLAN
3770 1250 7427 B $2: SKAZ R1,K3
3771 1251 0200 A RTS ;SEMI IS TERMINATOR GNVC,GNCVC
3772 1252 21F6 A JMP $RETC
3773 1253 ; BLANK
3774 1253 785E B $3: ISZ INPTR ;INPUT CHAR PTR
3775 1254 F423 B SKNE R1,ZERO
3776 1255 0201 A RTS 1
3777 1256 F426 B SKNE R1,K1
3778 1257 21E7 A JMP $1 ;SKIP BLANK GNVC
3779 1258 7C5E B OSZ INPTR ;INPUT CHAR PTR ;BLANK TERMINATES GNCV
3780 1259 0200 A RTS 0
3781 125A ;
3782 125A ; PROMPT SUBROUTINE
3783 125A ;
3784 125A 808E B PRMPT2: LD R0,LISTMD
3785 125B 2101 A JMP .+2
3786 125C 808F B PRMPT1: LD R0,ERRLST
3787 125D 1101 A BOC Z,+.2

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3788 125E 0200 A      RTS
3789 125F 805D B      LD      R0,PASS
3790 1260 F026 B      SKNE    R0,K1
3791 1261 2101 A      JMP     .+2
3792 1262 0200 A      RTS
3793 1263 4200 A PROMPT: PUSH    R2
3794 1264 4100 A      PUSH    R1
3795 1265 2CA5 I      JSR     NEWLIN
3796 1266 7C71 B      DSZ     PGRL
3797 1267 2102 A      JMP     .+3
3798 1268 4F07 A      LI      R3,7
3799 1269 2CDF I      JSR     OPGSTR      ;OUTPUT PAGE STRING
3800 126A 808C B      LD      R0,LCNT1
3801 126B 4D20 A      LI      R1,' '/256
3802 126C F038 B      SKNE    R0,CZERO      ;'0'/256
3803 126D 2103 A      JMP     $51
3804 126E 4D30 A      LI      R1,'0'/256
3805 126F 2CEE I      JSR     O1CH
3806 1270 2101 A      JMP     $52
3807 1271 2CF0 I $51:  JSR     O1B
3808 1272      ;      NOW OUTPUT LAST 4 CHAR OF LINE NUMBER
3809 1272 888D B $52:  LD      R2,LCNT2
3810 1273 A9C9 A      ST      R2,LCNT2A
3811 1274 2CCE I      JSR     OSPDEC      ;OUTPUT SPECIAL DECIMAL 4 TIMES
3812 1275 A88D B      ST      R2,LCNT2
3813 1276 2CF0 I      JSR     O1B
3814 1277 8089 B      LD      R0,INDEV      ;INPUT DEVICE 0=CR,1=KB,2=PT
3815 1278 605D B      AND     R0,PASS
3816 1279 1301 A      BOC     ODD,+.+2
3817 127A 2102 A      JMP     $NK2      ;NOT KB INPUT AND PASS2 BOTH
3818 127B 2CD4 I      JSR     O6B
3819 127C 2CD4 I      JSR     O6B
3820 127D      ;
3821 127D 8089 B $NK2: LD      R0,INDEV      ;INPUT DEVICE 0=CR,1=KB,2=PT
3822 127E 1301 A      BOC     ODD,+.+2
3823 127F 2102 A      JMP     .+3
3824 1280      ;      KB INPUT ,ISSUE PROMPT
3825 1280 4C2A A      LI      R0,'*'/256
3826 1281 2CEE I      JSR     O1CH
3827 1282 4500 A      PULL    R1
3828 1283 4600 A      PULL    R2
3829 1284 0200 A      RTS

3830 1285      .PAGE   'OBJECT MODULE ROUTINES'
3831 1285      .LOCAL
3832 1285      ;
3833 1285      ;      INITIALIZE OBJECT RECORD
3834 1285      ;
3835 1285 817E A INITOR: LD      R0,OBJPT1
3836 1286 A17C A      ST      R0,OBJPTR
3837 1287 810B A      LD      R0,X8004
3838 1288 A168 A      ST      R0,OBJREC
3839 1289 806B B      LD      R0,SECT
3840 128A D026 B      SUB     R0,K1
3841 128B A167 A      ST      R0,OBJREC+2
3842 128C 905C B      LD      R0,LOCCTR
3843 128D A166 A      ST      R0,OBJREC+3
3844 128E 4C00 A      LI      R0,0
3845 128F A165 A      ST      R0,WORD5
3846 1290 4C03 A      LI      R0,3
3847 1291 A164 A      ST      R0,WORD6      ; ND RELOCATION WORD
3848 1292 0200 A      RTS

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3849 1293 8004 A X8004: .WORD 08004
3850 1294 ;
3851 1294 ; OUTPUT OBJECT WORD (WORD IN R0, REL IN R2)
3852 1294 ;
3853 1294 OOWORD:
3854 1294 B16E A ST R0,OBJPTR
3855 1295 E82C B SKG R2,K4
3856 1296 2101 A JMP .+2
3857 1297 4E04 A LI R2,4
3858 1298 F823 B SKNE R2,ZERO
3859 1299 4E01 A LI R2,1
3860 129A D826 B SUB R2,K1
3861 129B 2913 A JSR SHIFT ;STORE REL BITS
3862 129C 7966 A ISZ OBJPTR
3863 129D 7953 A ISZ OBJREC
3864 129E 8164 A LD R0,OBJPTR
3865 129F F165 A SKNE R0,OBJPT2
3866 12A0 2101 A JMP OOREC
3867 12A1 0200 A RTS
3868 12A2 ;
3869 12A2 ; OUTPUT OBJECT RECORD
3870 12A2 ; IF ANY AND SET UP NEW RECORD
3871 12A2 ;
3872 12A2 OOREC:
3873 12A2 8160 A LD R0,OBJPTR
3874 12A3 F160 A SKNE R0,OBJPT1
3875 12A4 21E0 A JMP INITOR ;RECORD EMPTY ,INIT AND RETURN
3876 12A5 ; NOT EMPTY,SHIFT REL BITS
3877 12A5 4E00 A LI R2,0
3878 12A6 814E A $22: LD R0,WORD5
3879 12A7 1204 A BOC P,$21
3880 12A8 2906 A JSR SHIFT
3881 12A9 8D04 A LD R3,$OR
3882 12AA 2910 A JSR CKPNCH ;CHECKSUM AND PUNCH
3883 12AB 21D9 A JMP INITOR ;INIT NEW RECORD AND RETURN
3884 12AC 2902 A $21: JSR SHIFT
3885 12AD 21F8 A JMP $22
3886 12AE 12F1 A $OR: .WORD OBJREC
3887 12AF ;
3888 12AF ; SHIFT SHIFT WORD5,WORD6 LEFT 2
3889 12AF ; FILLING FROM R2 BITS 0,1
3890 12AF ;
3891 12AF SHIFT:
3892 12AF 8546 A LD R1,WORD6
3893 12B0 8144 A LD R0,WORD5
3894 12B1 5C02 A SHL R0,2
3895 12B2 5902 A ROL R1,2
3896 12B3 6427 B AND R1,K3
3897 12B4 3400 A RADD R1,R0
3898 12B5 A13F A ST R0,WORD5
3899 12B6 853F A LD R1,WORD6
3900 12B7 5D02 A SHL R1,2
3901 12B8 3900 A RADD R2,R1
3902 12B9 A53C A ST R1,WORD6
3903 12BA 0200 A RTS
3904 12BB ;
3905 12BB ; CHECKSUM AND PUNCH RECORD POINTED TO BY R3
3906 12BB ;
3907 12BB CKPNCH:
3908 12BB AD34 A ST R3,STMP
3909 12BC 805D B LD R0,PASS
3910 12BD 1401 A BOC B1EQ1,+.2
3911 12BE 0200 A RTS ;NOT PASS 2

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3912 12BF 801E B      LD      R0,DSKOBJ
3913 12C0 1204 A      BOC      P,$33          ; NO LEADER IF DISK OBJ
3914 12C1          ;      PUNCH LEADER AND STX CHAR
3915 12C1 2927 A      JSR      LEAD8
3916 12C2 4C02 A      LI       R0,2
3917 12C3 A00C A      ST       R0,PNCHMD          ; SET PUNCH MODE
3918 12C4 2CEE I      JSR      O1CH
3919 12C5          ;      COMPUTE CHECKSUM
3920 12C5          $33:
3921 12C5 8700 A      LD       R1,0(R3)
3922 12C6 643B B      AND      R1,HEX3F
3923 12C7 4C00 A      LI       R0,0
3924 12C8 C302 A      ADD      R0,2(R3)
3925 12C9 4B01 A      AISZ     R3,1
3926 12CA 49FF A      AISZ     R1,-1
3927 12CB 21FC A      JMP      .-3
3928 12CC 8D23 A      LD       R3,$TMP
3929 12CD A301 A      ST       R0,1(R3)          ;STORE CHECKSUM
3930 12CE 9116 A      LD       R0,@$ENDBUF
3931 12CF F300 A      SKNE     R0,0(R3)
3932 12D0 2103 A      JMP      .+4
3933 12D1 90A8 I      LD       R0,OBJCK
3934 12D2 C301 A      ADD      R0,1(R3)
3935 12D3 B0A8 I      ST       R0,OBJCK
3936 12D4          ;      FINISHED CHECKSUM , NOW PUNCH
3937 12D4          .IF      SIZE8
3938 12D4 801E B      LD       R0,DSKOBJ
3939 12D5 5000 A      CAI      R0,0
3940 12D6 1202 A      BOC      P,.-3
3941 12D7 8518 A      LD       R1,$TMP
3942 12D8 2417 B      JMP      @WDSKOB
3943 12D9          .ENDIF
3944 12D9 8700 A      LD       R1,0(R3)
3945 12DA 643B B      AND      R1,HEX3F
3946 12DB C440 B      ADD      R1,K2
3947 12DC          ;      TOP OF PUNCH LOOP
3948 12DC 8300 A $30:  LD       R0,0(R3)
3949 12DD 2CCD I      JSR      O2CH
3950 12DE          $31:
3951 12DE 4B01 A      AISZ     R3,1
3952 12DF 49FF A      AISZ     R1,-1
3953 12E0 21FB A      JMP      $30
3954 12E1 2CA5 I      JSR      NEWLIN
3955 12E2 4C00 A ENDPCH: LI      R0,0
3956 12E3 A00C A      ST       R0,PNCHMD
3957 12E4 0200 A      RTS
3958 12E5 0931 A $ENDBUF:.WORD ENDBUF
3959 12E6          ;
3960 12E6          ;      PUNCH 2 CHARACTERS
3961 12E6          ;
3962 12E6          ;
3963 12E6          ;      PUNCH LEADER
3964 12E6          ;
3965 12E6 2900 A LEAD:  JSR      .+1
3966 12E7 2900 A      JSR      .+1.
3967 12E8 2900 A      JSR      .+1
3968 12E9 2900 A LEAD8: JSR      .+1
3969 12EA 2900 A      JSR      .+1
3970 12EB 4C01 A      LI       R0,1
3971 12EC A00C A      ST       R0,PNCHMD
3972 12ED 4C00 A      LI       R0,0
3973 12EE 2CCD I      JSR      O2CH
3974 12EF 21F2 A      JMP      ENDPCH

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3975 12F0      ;
3976 12F0 12F1 A $TMP:  .=.+1
3977 12F1      ;
3978 12F1      ;      OBJECT MODULE DATA RECORD
3979 12F1      ;
3980 12F1 12F3 A OBJREC:  .=.+2
3981 12F3 12F4 A WORD3:   .=.+1
3982 12F4 12F5 A WORD4:   .=.+1
3983 12F5 12F6 A WORD5:   .=.+1
3984 12F6 1303 A WORD6:   .=.+13
3985 1303      ;
3986 1303 12F7 A OBJPTR:  .WORD  WORD6+1
3987 1304 12F7 A OBJPT1:  .WORD  WORD6+1
3988 1305 1303 A OBJPT2:  .WORD  OBJREC+18

3989 1306      .PAGE  'MISC SUBROUTINES'
3990 1306      .LOCAL
3991 1306      ;
3992 1306      ;      IFBYP      GO TO DIREND IF IN IFSKIP MODE
3993 1306      ;
3994 1306 8070 B IFBYP:  LD      R0,IFMODE
3995 1307 1507 A      BOC      NZ,$2
3996 1308 24C4 I      JMP      NEXTST
3997 1309      ;
3998 1309      ;      JSR      IFSKIP
3999 1309      ;      SUSPEND ASSEMBLY RET
4000 1309      ;      ASSEMBLE RETURN
4001 1309 8070 B IFSKIP: LD      R0,IFMODE
4002 130A 1501 A      BOC      NZ,$1
4003 130B 0200 A      RTS      0      ;SUSPEND
4004 130C 0201 A $1:   RTS      1      ;ASSEMBLE
4005 130D      ;
4006 130D      ;
4007 130D      ;      SKIP IF PASS 1
4008 130D      ;
4009 130D 805D B P2P1:  LD      R0,PASS      ;PASS1=0  PASS2=NZ
4010 130E 11FD A      BOC      Z,$1
4011 130F 0200 A $2:   RTS
4012 1310      ;
4013 1310      ;      SKIP IF PASS 2
4014 1310      ;
4015 1310 805D B P1P2:  LD      R0,PASS
4016 1311 15FA A      BOC      NZ,$1
4017 1312 0200 A      RTS
4018 1313      ;
4019 1313      ;      OUTPUT SPECIAL DECIMAL DIGIT
4020 1313      ;
4021 1313      ;      OSPDEC:
4022 1313 4FFC A      LI      R3,-4
4023 1314 5A04 A      ROL      R2,4
4024 1315 4C0F A      LI      R0,0F
4025 1316 3883 A      RAND      R2,R0
4026 1317 F028 B      SKNE      R0,K6
4027 1318 2106 A      JMP      $60      ;ZERO REPRESENTED
4028 1319 1502 A      BOC      NZ,$61
4029 131A C828 B      ADD      R2,K6
4030 131B 8028 B      LD      R0,K6
4031 131C C03C B $61:  ADD      R0,HEX2A
4032 131D 4D30 A      LI      R1,'0'/256
4033 131E 2101 A      JMP      .+2
4034 131F 3481 A $60:  RCPY      R1,R0
4035 1320 2CEE I      JSR      01CH

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4036 1321 4B01 A      AISZ      R3,1
4037 1322 21F1 A      JMP      OSPDEC+1
4038 1323 0200 A      RTS
4039 1324          ;
4040 1324          .LOCAL
4041 1324          ;
4042 1324          ;      GET COMMA
4043 1324          ;      JSR      GCOMMA
4044 1324          ;      NO COMMA OR END RETURN
4045 1324          ;      YES COMMA RETURN
4046 1324          GCOMMA:
4047 1324 A117 A      ST        R0,$T0
4048 1325 A517 A      ST        R1,$T0+1
4049 1326 A917 A      ST        R2,$T0+2
4050 1327 AD17 A      ST        R3,$T0+3
4051 1328 2C9E I      JSR      GNVC
4052 1329 2103 A      JMP      .+4          ;NO MORE
4053 132A F04F B      SKNE      R0,COMMA
4054 132B 2106 A      JMP      $1
4055 132C 7C5E B      DSZ      INPTR          ;INPUT CHAR PTR
4056 132D 810E A      LD        R0,$T0
4057 132E 850E A      LD        R1,$T0+1
4058 132F 890E A      LD        R2,$T0+2
4059 1330 8D0E A      LD        R3,$T0+3
4060 1331 0200 A      RTS      0          ;NOT A COMMA
4061 1332          ;      YES-COMMA
4062 1332 2C9E I $1:   JSR      GNVC
4063 1333 2102 A      JMP      .+3
4064 1334 7C5E B      DSZ      INPTR
4065 1335 2101 A      JMP      .+2
4066 1336 2D09 A      JSR      @SMERROR
4067 1337 8104 A      LD        R0,$T0
4068 1338 8504 A      LD        R1,$T0+1
4069 1339 8904 A      LD        R2,$T0+2
4070 133A 8D04 A      LD        R3,$T0+3
4071 133B 0201 A      RTS      1
4072 133C 1340 A $T0:  .=.+4
4073 1340 0F88 A SMERROR: .WORD  MERROR
4074 1341          .IF      SIZE8
4075 1341          ;
4076 1341          ;      DISK ERROR
4077 1341          ;
4078 1341 4C00 A      LI        R0,0
4079 1342 A05D B      ST        R0,PASS
4080 1343 8D03 A DSKERR: LD      R3,DEM
4081 1344 AC97 B      ST        R3,TYPMOD
4082 1345 2C9B I      JSR      ONLMSG
4083 1346 24D3 I      JMP      NEWASM
4084 1347 1348 A DEM:  .WORD      .+1
4085 1348 4449 A      .ASCII    'DISK ERRORS'
      1349 534B A
      134A 2045 A
      134B 5252 A
      134C 4F52 A
      134D 5320 A
4086 134E 0000 A      .WORD      0

4087 134F          .PAGE      'PROCESS CONTROL STATEMENT'
4088 134F          .LOCAL
4089 134F          ;
4090 134F          ;      PROCESS CONTROL STATEMENT
4091 134F          ;

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4092 134F      PRCTRL:
4093 134F 292B A      JSR      $GNAM
4094 1350 211B A      JMP      $4
4095 1351 8D36 A      LD       R3,$CTAB
4096 1352 8300 A $3:   LD       R0,0(R3)
4097 1353 1104 A      BOC      Z,$1      ;FINISHED SEARCH AND NOT FOUND
4098 1354 F07D B      SKNE     R0,NAM0    ;1ST 2 CHARACTERS OF NAME
4099 1355 2103 A      JMP      $2
4100 1356 4B03 A      AISZ     R3,3
4101 1357 21FA A      JMP      $3      ;LOOP
4102 1358 0200 A $1:   RTS      ;ILLEGAL NAME
4103 1359      ;      FOUND
4104 1359 9301 A $2:   LD       R0,1(R3)
4105 135A      .IF      SIZE8
4106 135A 120B A      BOC      P,$5
4107 135B AC75 B      ST       R3,FORMB
4108 135C 2C9F I      JSR      GITEM
4109 135D 0200 A      RTS
4110 135E 8094 B      LD       R0,IDSKIN
4111 135F 6895 B      OR       R0,IDSKTM
4112 1360 1304 A      BOC      ODD,$RTS
4113 1361 8086 B      LD       R0,ITVAL
4114 1362 8C75 B      LD       R3,FORMB
4115 1363 E116 A      SKG      R0,K639
4116 1364 1201 A      BOC      P,.,+2
4117 1365 0200 A $RTS: RTS
4118 1366      $5:
4119 1366      .ENDIF
4120 1366 B302 A      ST       R0,@2(R3)
4121 1367 2C9E I      JSR      GNVC
4122 1368 2103 A      JMP      $4
4123 1369 F04F B      SKNE     R0,COMMA
4124 136A 21E4 A      JMP      PRCTRL
4125 136B 0200 A      RTS
4126 136C 808F B $4:   LD       R0,ERRLIST
4127 136D 1501 A      BOC      NZ,.,+2
4128 136E A091 B      ST       R0,NOLIST
4129 136F      .IF      SIZE8
4130 136F 801E B      LD       R0,DSKOBJ
4131 1370 C040 B      ADD      R0,K2
4132 1371 1102 A      BOC      Z,.,+3
4133 1372 4C01 A      LI       R0,1
4134 1373 A090 B      ST       R0,OBJMOD
4135 1374 8094 B      LD       R0,IDSKIN
4136 1375 C040 B      ADD      R0,K2
4137 1376 1102 A      BOC      Z,.,+3
4138 1377 4C00 A      LI       R0,0
4139 1378 A089 B      ST       R0,INDEV
4140 1379      .ENDIF
4141 1379 0201 A      RTS      1
4142 137A 027F A K639: .WORD    639
4143 137B      ;
4144 137B      ;
4145 137B      $GNAM:
4146 137B 2C9E I      JSR      GNVC
4147 137C 0200 A      RTS
4148 137D 5C08 A      SHL      R0,8
4149 137E A07D B      ST       R0,NAM0    ;1ST 2 CHARACTERS OF NAME
4150 137F 2C9E I      JSR      GNVC
4151 1380 4C20 A $10:  LI       R0,' '/256
4152 1381 F04F B      SKNE     R0,COMMA
4153 1382 2103 A      JMP      $11
4154 1383 C07D B      ADD      R0,NAM0    ;1ST 2 CHARACTERS OF NAME

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4155 1384 A07D B      ST      R0,NAM0      ;1ST 2 CHARACTERS OF NAME
4156 1385 0201 A      RTS      1
4157 1386 7C5E B $11: DSZ      INPTR      ;INPUT CHAR PTR
4158 1387 21F8 A      JMP      S10
4159 1388            ;
4160 1388            ;      CONTROL STATEMENT TABLE
4161 1388            ;
4162 1388 1389 A $CTAB: .WORD      '+1
4163 1389 4B42 A      .WORD      'KB',1,INDEV
      138A 0001 A
      138B 0089 B
4164 138C 5054 A      .WORD      'PT',2,INDEV
      138D 0002 A
      138E 0089 B
4165 138F 4F4D A      .WORD      'OM',1,OBJMOD
      1390 0001 A
      1391 0090 B
4166 1392 5820 A      .WORD      'X ',1,XINOK
      1393 0001 A
      1394 0069 B
4167 1395 4E4C A      .WORD      'NL',0,NOLIST
      1396 0000 A
      1397 0091 B
4168 1398 4E43 A      .WORD      'NC',';'/256,NOCOM
      1399 003B A
      139A 0092 B
4169 139B 454C A      .WORD      'EL',0,ERRLIST
      139C 0000 A
      139D 008F B
4170 139E 4E4D A      .WORD      'NM',0,NOMAP
      139F 0000 A
      13A0 0093 B
4171 13A1            .IF      DBGVER
4172 13A1 4544 A      .WORD      'ED',1,ERDEB
      13A2 0001 A
      13A3 0098 B
4173 13A4 4D44 A      .WORD      'MD',1,MAPDEB
      13A5 0001 A
      13A6 0099 B
4174 13A7            .ENDIF
4175 13A7            .IF      SIZES
4176 13A7 4352 A      .WORD      'CR',0,INDEV
      13A8 0000 A
      13A9 0089 B
4177 13AA 4449 A      .WORD      'DI',-1,IDSKIN
      13AB FFFF A
      13AC 0094 B
4178 13AD 4454 A      .WORD      'DT',-1,IDSKTM
      13AE FFFF A
      13AF 0095 B
4179 13B0 444F A      .WORD      'DO',-1,DSKOBJ
      13B1 FFFF A
      13B2 001E B
4180 13B3 5052 A      .WORD      'PR',0,HSPR
      13B4 0000 A
      13B5 0096 B
4181 13B6            .ENDIF
4182 13B6 0000 A      .WORD      0

4183 13B7            .PAGE      'ERROR SUBROUTINE'
4184 13B7            .LOCAL
4185 13B7      ERROR:

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4186 13B7 A942 A      ST      R2,$STR2
4187 13B8 4000 A      PUSH    R0
4188 13B9 805E B      LD      R0,INPTR
4189 13BA A05F B      ST      R0,LCPTR
4190 13BB 7C5F B $3:   DSZ     LCPTR
4191 13BC 905F B      LD      R0,@LCPTR
4192 13BD F034 B      SKNE    R0,BLANK
4193 13BE 21FC A      JMP     $3
4194 13BF 785F B      ISZ     LCPTR
4195 13C0 4400 A      PULL    R0
4196 13C1 4000 A      PUSH    R0
4197 13C2 888B B      LD      R2,ERRPT
4198 13C3 F923 A      SKNE    R2,$ERRMX
4199 13C4 210A A      JMP     $1
4200 13C5 A200 A      ST      R0,0(R2)
4201 13C6 805F B      LD      R0,LCPTR
4202 13C7 D012 B      SUB     R0,INBUFB
4203 13C8 F208 A      SKNE    R0,ELIM(R2)
4204 13C9 2105 A      JMP     $1
4205 13CA A209 A      ST      R0,ELIM+1(R2)
4206 13CB 808B B      LD      R0,ERRPT
4207 13CC 788B B      ISZ     ERRPT
4208 13CD F055 B      SKNE    R0,ERRBAS
4209 13CE 2D2C A      JSR     @SPRMPT1
4210 13CF          $1:
4211 13CF          .IF      DBGVER
4212 13CF 8098 B      LD      R0,ERDEB
4213 13D0 1113 A      BOC     Z,$2          ;NOT IN MAP DEBUG MODE
4214 13D1 2CA5 I      JSR     NEWLIN
4215 13D2 8126 A      LD      R0,$E1
4216 13D3 2CCD I      JSR     O2CH
4217 13D4 4400 A      PULL    R0
4218 13D5 2CD2 I      JSR     OHEX
4219 13D6 2CEF I      JSR     O2B
4220 13D7 4400 A      PULL    R0
4221 13D8 4000 A      PUSH    R0
4222 13D9 2CD2 I      JSR     OHEX
4223 13DA 2CEF I      JSR     O2B
4224 13DB 805F B      LD      R0,LCPTR
4225 13DC D012 B      SUB     R0,INBUFB
4226 13DD 2CD2 I      JSR     OHEX
4227 13DE 811A A      LD      R0,$E1
4228 13DF 2CCD I      JSR     O2CH
4229 13E0 2CA5 I      JSR     NEWLIN
4230 13E1 8918 A      LD      R2,$STR2
4231 13E2 3081 A      NOP
4232 13E3 0200 A      RTS
4233 13E4          .ENDIF
4234 13E4 4400 A $2:   PULL    R0
4235 13E5 8914 A      LD      R2,$STR2
4236 13E6 0200 A      RTS
4237 13E7          ;
4238 13E7 13F0 A $ERRMX: .WORD   ERBUF+ELIM
4239 13E8 13F0 A ERBUF:  .=. +ELIM
4240 13F0 FFFF A      .WORD   -1
4241 13F1 13F9 A      .=. +ELIM
4242 13F9 2A2A A $E1:   .WORD   '***'
4243 13FA 13FB A $STR2: .=. +1
4244 13FB 125C A $PRMPT1: .WORD   PRMPT1

4245 13FC          .PAGE   'SPECIAL DEBUGGING DIRECTIVES'
4246 13FC          .IF      DBGVER

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4247 13FC          .LOCAL
4248 13FC          ;
4249 13FC          PASS1:
4250 13FC 4C00 A    LI      R0,0
4251 13FD 2101 A    JMP     $1
4252 13FE          ;
4253 13FE          PASS2:
4254 13FE 4C01 A    LI      R0,1
4255 13FF A05D B    $1:    ST      R0,PASS
4256 1400 24D7 I    JMP     DIREND
4257 1401          ;
4258 1401          PASS4:
4259 1401 4E03 A    LI      R2,3
4260 1402 21FC A    JMP     $1
4261 1403          ;
4262 1403          MAPDIR:
4263 1403 2D01 A    JSR     @.+2          ;OUTPUT MAP NO RESET OF P BITS
4264 1404 24D7 I    JMP     DIREND
4265 1405 0D97 A    .WORD    OMAPNR
4266 1406          .ENDIF

4267 1406          .PAGE    'DIRECTIVE / INSTRUCTION TABLE'
4268 1406          ;
4269 1406          ;    DIRECTIVE / INSTRUCTION TABLE
4270 1406          ;
4271 1406          DITBLB:
4272 1406 0000 A    .WORD    0,WORD,'.W'+S,'OR','D'
4273 1406 0A80 A
4274 1406 AE57 A
4275 1406 4F52 A
4276 1406 4420 A
4277 140B 0000 A    .WORD    0,EXTD,'.E'+S,'XT','D'
4278 140C 0A54 A
4279 140D AE45 A
4280 140E 5854 A
4281 140F 4420 A
4282 1410 0000 A    .WORD    0,LIST,'.L'+S,'IS','T'
4283 1411 0AC2 A
4284 1412 AE4C A
4285 1413 4953 A
4286 1414 5420 A
4287 1415          .IF      SIZE8
4288 1415 0000 A    .WORD    0,FORM,'.F'+S,'OR','M'
4289 1416 09D5 A
4290 1417 AE46 A
4291 1418 4F52 A
4292 1419 4D20 A
4293 141A          .ENDIF
4294 141A 0000 A    .WORD    0,ELSE,'.E'+S,'LS','E'
4295 141B 09BD A
4296 141C AE45 A
4297 141D 4C53 A
4298 141E 4520 A
4299 141F 0000 A    .WORD    0,PAGE,'.P'+S,'AG','E'
4300 1420 0A97 A
4301 1421 AE50 A
4302 1422 4147 A
4303 1423 4520 A
4304 1424 0000 A    .WORD    0,IF,'.I','F'
4305 1425 09A3 A
4306 1426 2E49 A
4307 1427 4620 A

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4281 1428 0000 A      .WORD 0,END,'.E','ND'
      1429 0867 A
      142A 2E45 A
      142B 4E44 A
4282 142C 0000 A      .WORD 0,TITLE,'.T'+S,'IT','LE'
      142D 0AD9 A
      142E AE54 A
      142F 4954 A
      1430 4C45 A
4283 1431 0000 A      .WORD 0,ASECT,'.A'+S,'SE','CT'
      1432 0A41 A
      1433 AE41 A
      1434 5345 A
      1435 4354 A
4284 1436 0000 A      .WORD 0,BSECT,'.B'+S,'SE','CT'
      1437 0A50 A
      1438 AE42 A
      1439 5345 A
      143A 4354 A
4285 143B 0000 A      .WORD 0,TSECT,'.T'+S,'SE','CT'
      143C 0A52 A
      143D AE54 A
      143E 5345 A
      143F 4354 A
4286 1440 0000 A      .WORD 0,SPACE,'.S'+S,'PA','CE'
      1441 0AAE A
      1442 AE53 A
      1443 5041 A
      1444 4345 A
4287 1445 0000 A      .WORD 0,GLOBL,'.G'+S,'LO','BL'
      1446 0A63 A
      1447 AE47 A
      1448 4C4F A
      1449 424C A
4288 144A 0000 A      .WORD 0,LOCAL,'.L'+S,'OC','AL'
      144B 0A76 A
      144C AE4C A
      144D 4F43 A
      144E 414C A
4289 144F 0000 A      .WORD 0,ASCII,'.A'+S,'SC','II'
      1450 0A89 A
      1451 AE41 A
      1452 5343 A
      1453 4949 A
4290 1454 0000 A      .WORD 0,ENDIF,'.E'+S,'ND','IF'
      1455 09CA A
      1456 AE45 A
      1457 4E44 A
      1458 4946 A
4291 1459          .IF    DBGVER
4292 1459 0000 A      .WORD 0,PASS1,'.P','1'
      145A 13FC A
      145B 2E50 A
      145C 3120 A
4293 145D 0000 A      .WORD 0,PASS2,'.P','2'
      145E 13FE A
      145F 2E50 A
      1460 3220 A
4294 1461 0000 A      .WORD 0,PASS4,'.P','4'
      1462 1401 A
      1463 2E50 A
      1464 3420 A
4295 1465 0000 A      .WORD 0,MAPDIR,'.M','AP'

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1466 1403 A
1467 2E4D A
1468 4150 A
4296 1459 .ENDIF
4297 1469 0000 A .WORD 0,ASMDIR,'.A','SM'
146A 0AD4 A
146B 2E41 A
146C 534D A
4298 146D ;
4299 146D ; INSTRUCTIONS
4300 146D ;
4301 146D 8000 A LD 0,0
4302 146E 0EB6 A .WORD IC1,'LD',' '
146F 4C44 A
1470 2020 A
4303 1471 A000 A ST 0,0
4304 1472 0EB6 A .WORD IC1,'ST',' '
1473 5354 A
1474 2020 A
4305 1475 C000 A ADD 0,0
4306 1476 0ECA A .WORD IC2,'AD','D '
1477 4144 A
1478 4420 A
4307 1479 D000 A SUB 0,0
4308 147A 0ECA A .WORD IC2,'SU','B '
147B 5355 A
147C 4220 A
4309 147D E000 A SKG 0,0
4310 147E 0ECA A .WORD IC2,'SK','G '
147F 534B A
1480 4720 A
4311 1481 F000 A SKNE 0,0
4312 1482 0ECA A .WORD IC2,'SK','NE '
1483 534B A
1484 4E45 A
4313 1485 6000 A AND 0,0
4314 1486 0ED5 A .WORD IC3,'AN','D '
1487 414E A
1488 4420 A
4315 1489 6800 A OR 0,0
4316 148A 0ED5 A .WORD IC3,'OR',' '
148B 4F52 A
148C 2020 A
4317 148D 7000 A SKAZ 0,0
4318 148E 0ED5 A .WORD IC3,'SK','AZ '
148F 534B A
1490 415A A
4319 1491 7800 A ISZ 0
4320 1492 0ED1 A .WORD IC4,'IS','Z '
1493 4053 A
1494 5A20 A
4321 1495 7C00 A DSZ 0
4322 1496 0ED1 A .WORD IC4,'DS','Z '
1497 4453 A
1498 5A20 A
4323 1499 3091 A NOP
4324 149A 0ED9 A .WORD IC5,'NO','P '
149B 4E4F A
149C 5020 A
4325 149D 0080 A PUSHF
4326 149E 0ED9 A .WORD IC5,08000+'PU','SH','F '
149F D055 A
14A0 5348 A

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14A1	4620	A		
4327	14A2	0280	A	PULLF
4328	14A3	0ED9	A	.WORD IC5,08000+'PU','LL','F'
	14A4	D055	A	
	14A5	4C4C	A	
	14A6	4620	A	
4329	14A7	0000	A	HALT
4330	14A8	0ED9	A	.WORD IC5,'HA','LT'
	14A9	4841	A	
	14AA	4C54	A	
4331	14AB	0510	A	.WORD 0510
4332	14AC	0EDB	A	.WORD IC5A,08000+'IS','CA','N';ISCAN
	14AD	C953	A	
	14AE	4341	A	
	14AF	4E20	A	
4333	14B0	4000	A	PUSH 0
4334	14B1	0EDE	A	.WORD IC6,'PU','SH'
	14B2	5055	A	
	14B3	5348	A	
4335	14B4	4400	A	PULL 0
4336	14B5	0EDE	A	.WORD IC6,'PU','LL'
	14B6	5055	A	
	14B7	4C4C	A	
4337	14B8	5400	A	.WORD 05400
4338	14B9	0EDE	A	.WORD IC6,08000+'XC','HR','S'
	14BA	D843	A	
	14BB	4852	A	
	14BC	5320	A	
4339	14BD	4800	A	AISZ 0,0
4340	14BE	0EE3	A	.WORD IC7,'AI','SZ'
	14BF	4149	A	
	14C0	535A	A	
4341	14C1	4C00	A	LI 0,0
4342	14C2	0EE3	A	.WORD IC7,'LI',''
	14C3	4C49	A	
	14C4	2020	A	
4343	14C5	5000	A	CAI 0,0
4344	14C6	0EE3	A	.WORD IC7,'CA','I'
	14C7	4341	A	
	14C8	4920	A	
4345	14C9	5800	A	ROL 0,0
4346	14CA	0EE3	A	.WORD IC7,'RO','L'
	14CB	524F	A	
	14CC	4C20	A	
4347	14CD	5C00	A	SHL 0,0
4348	14CE	0EE3	A	.WORD IC7,'SH','L'
	14CF	5348	A	
	14D0	4C20	A	
4349	14D1	5800	A	ROR 0,0
4350	14D2	0EEE	A	.WORD IC7A,'RO','R'
	14D3	524F	A	
	14D4	5220	A	
4351	14D5	5C00	A	SHR 0,0
4352	14D6	0EEE	A	.WORD IC7A,'SH','R'
	14D7	5348	A	
	14D8	5220	A	
4353	14D9	3000	A	RADD 0,0
4354	14DA	0EFB	A	.WORD IC8,'RA','DD'
	14DB	5241	A	
	14DC	4444	A	
4355	14DD	3080	A	RXCH 0,0
4356	14DE	0EFB	A	.WORD IC8,'RX','CH'
	14DF	5258	A	

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14E0	4348	A			
4357	14E1	3081	A	RCPY	0,0
4358	14E2	0EFB	A	.WORD	IC8,'RC','PY'
	14E3	5243	A		
	14E4	5059	A		
4359	14E5	3082	A	RXOR	0,0
4360	14E6	0EFB	A	.WORD	IC8,'RX','OR'
	14E7	5258	A		
	14E8	4F52	A		
4361	14E9	3083	A	RAND	0,0
4362	14EA	0EFB	A	.WORD	IC8,'RA','ND'
	14EB	5241	A		
	14EC	4E44	A		
4363	14ED	2000	A	JMP	0
4364	14EE	0F0A	A	.WORD	IC9,'JM','P'
	14EF	4A4D	A		
	14F0	5020	A		
4365	14F1	2800	A	JSR	0
4366	14F2	0F0A	A	.WORD	IC9,'JS','R'
	14F3	4A53	A		
	14F4	5220	A		
4367	14F5	0800	A	SFLG	0
4368	14F6	0F17	A	.WORD	IC10,'SF','LG'
	14F7	5346	A		
	14F8	4C47	A		
4369	14F9	0880	A	PFLG	0
4370	14FA	0F17	A	.WORD	IC10,'PF','LG'
	14FB	5046	A		
	14FC	4C47	A		
4371	14FD	1000	A	BOC	0,++1
4372	14FE	0F22	A	.WORD	IC11,'BO','C'
	14FF	424F	A		
	1500	4320	A		
4373	1501	0200	A	RTS	0
4374	1502	0F34	A	.WORD	IC12,'RT','S'
	1503	5254	A		
	1504	5320	A		
4375	1505	0400	A	RIN	0
4376	1506	0F34	A	.WORD	IC12,'RI','N'
	1507	5249	A		
	1508	4E20	A		
4377	1509	0600	A	ROUT	0
4378	150A	0E34	A	.WORD	IC12,'RO','UT'
	150B	524F	A		
	150C	5554	A		
4379	150D	0100	A	RTI	0
4380	150E	0F34	A	.WORD	IC12,'RT','I'
	150F	5254	A		
	1510	4920	A		
4381	1511	0300	A	.WORD	0300 ;JSRP
4382	1512	0F38	A	.WORD	IC12A,'JS','RP'
	1513	4A53	A		
	1514	5250	A		
4383	1515	0520	A	.WORD	0520 ;JINT
4384	1516	0F3E	A	.WORD	IC13A,'JI','NT'
	1517	4A49	A		
	1518	4E54	A		
4385	1519	0700	A	.WORD	0700 ;SETST
4386	151A	0F3E	A	.WORD	IC13A,08000+'SE','TS','T'
	151B	D345	A		
	151C	5453	A		
	151D	5420	A		
4387	151E	0710	A	.WORD	0710 ;CLRST

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4388 151F 0F3E A      .WORD    IC13A,08000+'CL','RS','T'
      1520 C34C A
      1521 5253 A
      1522 5420 A
4389 1523 0720 A      .WORD    0720          ;SETBIT
4390 1524 0F3E A      .WORD    IC13A,08000+'SE','TB','IT'
      1525 D345 A
      1526 5442 A
      1527 4954 A
4391 1528 0730 A      .WORD    0730          ;CLRBIT
4392 1529 0F3E A      .WORD    IC13A,08000+'CL','RB','IT'
      152A C34C A
      152B 5242 A
      152C 4954 A
4393 152D 0750 A      .WORD    0750          ;SKBIT
4394 152E 0F3E A      .WORD    IC13A,S+'SK','BI','T'
      152F D34B A
      1530 4249 A
      1531 5420 A
4395 1532 0740 A      .WORD    0740          ;SKSTF
4396 1533 0F3E A      .WORD    IC13A,S+'SK','ST','F'
      1534 D34B A
      1535 5354 A
      1536 4620 A
4397 1537 0760 A      .WORD    0760          ;CMPBIT
4398 1538 0F3E A      .WORD    IC13A,08000+'CM','PB','IT'
      1539 C34D A
      153A 5042 A
      153B 4954 A
4399 153C 0500 A      .WORD    0500          ;JMPP
4400 153D 0F3E A      .WORD    IC13A,'JM','PP'
      153E 4A4D A
      153F 5050 A
4401 1540 0480 A      .WORD    0480          ;MPY
4402 1541 0F44 A      .WORD    IC14,'MP','Y'
      1542 4D50 A
      1543 5920 A
4403 1544 0490 A      .WORD    0490          ;DIV
4404 1545 0F44 A      .WORD    IC14,'DI','V'
      1546 4449 A
      1547 5620 A
4405 1548 04A0 A      .WORD    04A0          ;DADD
4406 1549 0F44 A      .WORD    IC14,'DA','DD'
      154A 4441 A
      154B 4444 A
4407 154C 04B0 A      .WORD    04B0          ;DSUB
4408 154D 0F44 A      .WORD    IC14,'DS','UB'
      154E 4453 A
      154F 5542 A
4409 1550 04C0 A      .WORD    04C0          ;LDB
4410 1551 0F46 A      .WORD    IC15,'LD','B'
      1552 4C44 A
      1553 4220 A
4411 1554 04D0 A      .WORD    04D0          ;STB
4412 1555 0F46 A      .WORD    IC15,'ST','B'
      1556 5354 A
      1557 4220 A
4413 1558 04C0 A      .WORD    04C0          ;LLB
4414 1559 0F46 A      .WORD    IC15,'LL','B'
      155A 4C4C A
      155B 4220 A
4415 155C 04D0 A      .WORD    04D0          ;SLB
4416 155D 0F46 A      .WORD    IC15,'SL','B'

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155E 534C A
155F 4220 A
4417 1560 04C0 A      .WORD 04C0      ;LRB
4418 1561 0F49 A      .WORD IC16,'LR','B'
1562 4C52 A
1563 4220 A
4419 1564 04D0 A      .WORD 04D0      ;SRB
4420 1565 0F49 A      .WORD IC16,'SR','B'
1566 5352 A
1567 4220 A
4421 1568 0380 A      .WORD 0380      ;JSRI
4422 1569 0F50 A      .WORD IC17,'JS','RI' ;JSRI
156A 4A53 A
156B 5249 A
4423 156C      DITBL2:
4424 156C      ;      END IF IMP 16 ASSEMBLER
4425 156C      ;
4426 156C      .IF      SIZE8
4427 156C 1699 A PTRTAB: .=.+301
4428 1699      PTREND:
4429 1699      ;      BAD SECTOR TABLE
4430 1699 16C1 A BADSTB: .=.+40
4431 16C1      STBAS:
4432 16C1 072C A      .END      START

```

POINTERS GENERATED

```

009A 0956 A
009B 10EA A
009C 11F8 A
009D 1324 A
009E 123E A
009F 0BEC A
00A0 156C A
00A1 1698 A
00A2 10D2 A
00A3 0967 A
00A4 134F A
00A5 10E3 A
00A6 06F0 A
00A7 0935 A
00A8 0936 A
00A9 1285 A
00AA 13B7 A
00AB 1065 A
00AC 110A A
00AD 1114 A
00AE 108B A
00AF 11BB A
00B0 0C82 A
00B1 0B0C A
00B2 0B28 A
00B3 1306 A
00B4 0B47 A
00B5 0C90 A
00B6 0D3B A
00B7 0CDE A
00B8 102F A
00B9 0B5D A
00BA 07D1 A
00BB 07C9 A
00BC 12A2 A
00BD 0A58 A

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```

00BE 1093 A
00BF 0979 A
00C0 092F A
00C1 0937 A
00C2 0D90 A
00C3 07A2 A
00C4 07D3 A
00C5 0943 A
00C6 0D92 A
00C7 0983 A
00C8 12E6 A
00C9 071C A
00CA 071B A
00CB 12BB A
00CC 0D8E A
00CD 10E4 A
00CE 1313 A
00CF 099B A
00D0 10EB A
00D1 0994 A
00D2 10A5 A
00D3 076A A
00D4 10B5 A
00D5 1012 A
00D6 109D A
00D7 07CE A
00D8 0C71 A
00D9 07C6 A
00DA 1041 A
00DB 1043 A
00DC 0C6F A
00DD 0D52 A
00DE 0D7C A
00DF 10F6 A
00E0 1032 A
00E1 0719 A
00E2 071D A
00E3 071E A
00E4 071F A
00E5 07E0 A
00E6 130D A
00E7 07C7 A
00E8 1310 A
00E9 124E A
00EA 0D7F A
00EB 07CA A
00EC 124B A
00ED 0E53 A
00EE 10BA A
00EF 10B7 A
00F0 10B9 A
00F1 103B A
00F2 0F7F A
00F3 0F92 A
00F4 0F91 A
00F5 07CC A
00F6 1039 A
00F7 07CB A
00F8 0F84 A
00F9 1037 A
00FA 0F88 A
00FB 103D A
00FC 103F A

```

00FD 1015 A
 00FE 0F33 A
 00FF 118E A

***** 0 ERRORS IN ASSEMBLY *****

\$1&	\$1(	\$1)	\$1*	\$1+	\$1,	\$1-	\$1.	\$1/	\$10
09B1 A	0A42 A	0A66 A	0AA9 A	0AF0 A	0B41 A	0B6A A	0C23 A	0C89 A	0CE8 A
\$10\$	\$10'	\$10)	\$10,	\$10/	\$100	\$100.	\$1004	\$1009	\$102
085B A	09F2 A	0A94 A	0B3E A	0CD8 A	0D27 A	0C20 A	0E55 A	1129 A	0D7B A
\$1029	\$1039	\$1049	\$106	\$10;	\$10?	\$10A;	\$10B;	\$11\$	\$11'
1116 A	111F A	1148 A	100D A	11DD A	1380 A	11F3 A	11DF A	0829 A	09EF A
\$11)	\$11-	\$11/	\$1115	\$112	\$115	\$11?	\$11A\$	\$11B\$	\$11B;
0A91 A	0BB8 A	0CD9 A	0F30 A	0D8A A	0EC2 A	1386 A	0843 A	0831 A	1216 A
\$11C;	\$12	\$12\$	\$12'	\$12)	\$12-	\$12/	\$122	\$125	\$12;
11EB A	0D79 A	0819 A	09FC A	0A8C A	0BB9 A	0CDB A	0D88 A	0EC5 A	11FB A
\$12A;	\$12B;	\$13	\$13\$	\$13'	\$13-	\$14-	\$15-	\$17	\$18
1203 A	11FF A	0E16 A	0857 A	0A0E A	0BA3 A	0BA0 A	0B95 A	1054 A	1072 A
\$194	\$1:	\$1;	\$1=	\$1>	\$1?	\$1@	\$1A	\$1A)	\$1A-
0E79 A	1191 A	123F A	130C A	1332 A	1358 A	13CF A	13FF A	0A6C A	0B74 A
\$2"	\$2'	\$2)	\$2*	\$2+	\$2,	\$2.	\$2/	\$20	\$20'
0750 A	0A18 A	0A72 A	0A9E A	0AF8 A	0B53 A	0C25 A	0C90 A	0D09 A	0A39 A
\$20,	\$20-	\$2009	\$204	\$21	\$214	\$215	\$21<	\$22	\$224
0B15 A	0BCA A	1146 A	0E6F A	0D3E A	0E71 A	0ECD A	12AC A	0D59 A	0E80 A
\$22<	\$23	\$234	\$26	\$27	\$2:	\$2;	\$2=	\$2?	\$2@
12A6 A	0E2A A	0E83 A	0FB9 A	104B A	11B6 A	1250 A	130F A	1359 A	13E4 A
\$2A'	\$2A0	\$2A2	\$2A3	\$2B1	\$2B3	\$3"	\$3'	\$3)	\$3*
0A21 A	0D0E A	0D57 A	0E2E A	0D45 A	0E33 A	0760 A	0A23 A	0A71 A	0AA0 A
\$3+	\$3,	\$3.	\$3/	\$30	\$30-	\$30.	\$3003	\$30<	\$31
0AFD A	0B55 A	0C26 A	0C93 A	0CEC A	0BEA A	0C18 A	0DAA A	12DC A	0D49 A
\$31<	\$32	\$33	\$33<	\$36	\$37	\$38	\$3:	\$3;	\$3?
12DE A	0D68 A	0E52 A	12C5 A	0FBD A	105D A	1080 A	119F A	1253 A	1352 A
\$3@	\$3A3	\$4'	\$4)	\$4*	\$4+	\$4.	\$4/	\$40	\$41
13BB A	0DBA A	0A00 A	0A74 A	0AA5 A	0AF9 A	0C2D A	0CAD A	0CF0 A	0D4A A
\$415	\$42	\$43	\$47	\$4:	\$4?	\$4A/	\$4B/	\$5'	\$5)
0ED2 A	0D64 A	0E4C A	1030 A	11A9 A	136C A	0CB6 A	0CB2 A	0A0A A	0A7E A
\$5+	\$5,	\$50%	\$506	\$50;	\$51%	\$516	\$51;	\$52	\$526
0B02 A	0B3F A	08BC A	101A A	11CC A	089B A	101E A	1271 A	0D5B A	1026 A
\$52;	\$53	\$57	\$5:	\$5?	\$5A\$	\$6)	\$6,	\$60	\$60;
1272 A	0DC3 A	1033 A	119B A	1366 A	07FD A	0A83 A	0B57 A	0D05 A	11C4 A
\$60=	\$61;	\$61=	\$62	\$63	\$6:	\$7\$	\$7,	\$70	\$72
131F A	11C1 A	131C A	0D6D A	0DDC A	11AD A	085E A	0B18 A	0D07 A	0D5F A
\$73	\$7:	\$7A\$	\$8\$	\$80	\$805	\$82	\$8:	\$9\$	\$90
0E3C A	11A2 A	0860 A	0855 A	0D1F A	0F07 A	0D74 A	1198 A	001F A	0D0F A

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$915   $92   $925   $ABS16 $ABS6   $ADR6   $ADRO6 $AERR6 $AND-   $APEN0
0F0F A 0D72 A 0F12 A 0FB4 A 0FA9 A 0F93 A 0FBC A 0FDF A 0BC7 A 0CF3 A

$APPE0 $BBIT' $BKSP; $BLNK+ $BOTM4 $BS0.   $BSEC6 $BSPR. $BYP1* $CBS
0CF3 A 0A3C A 1237 A 0AFB A 0EA8 A 0C6C A 100A A 0C12 A 0ABE A 07C5 A

$CBZ3   $CI6   $CK,   $COM-   $CONV3 $CT3   $CTAB? $DEC.   $DEF6   $DIV-
0DEB A 102E A 0B21 A 0BD0 A 0DE4 A 0DF7 A 1388 A 0C3D A 0FA0 A 0BC1 A

$DL/    $DOT$   $DOT.   $DT/    $E10   $EB%   $EERR- $EL%   $ELOK& $END'
0CBB A 07EC A 0C61 A 0CBA A 13F9 A 0930 A 0B94 A 08C9 A 09C3 A 0A2B A

$END2   $END4   $ENDB< $EP1%   $EP2%   $EQPG8 $EQTT8 $ERET6 $ERR.   $ERRM0
0D8D A 0EB2 A 12E5 A 0896 A 0895 A 10FF A 1100 A 0FD6 A 0C69 A 13E7 A

$EX0-   $EXPN-   $EXPN7 $EXT6   $F16$   $FB1$   $FB2$   $FBITS $FFFF' $FIN-
0BDB A 0BD1 A 1044 A 100A A 0847 A 084E A 0851 A 084B A 0A3F A 0BD7 A

$FIN1%   $FIN2%   $FIN3% $FINI% $FLAG3 $FLAG7 $FO3   $FPTR' $FRELS $FVAL$
0929 A 0900 A 0922 A 08F9 A 0DFB A 1064 A 0DF8 A 0A3D A 0865 A 0864 A

$GAN/    $GC;    $GDEC" $GL/    $GL1/    $GLBN3 $GNAM? $GOOD4 $GP/    $GP1/
0CD0 A 11FD A 0762 A 0CC5 A 0CC6 A 0DF4 A 137B A 0EA0 A 0CBC A 0CBD A

$GR/     $GR14   $GR24   $GR4    $GS1/    $GS2/    $HEX.   $IBEN: $IBL;   $IFLA6
0CCB A 0E8A A 0E8F A 0E91 A 0C7F A 0C72 A 0C08 A 11BA A 124D A 1010 A

$IOK16   $IOK26   $IOK36 $IOK46   $IOK56 $IOK6   $IOK66 $IPTR: $LAST3 $LF;
1003 A 0FF9 A 0FF5 A 0FFE A 0FEE A 0FE5 A 1007 A 11B9 A 0D96 A 123C A

$LONG3   $LOOP'   $LOOP3   $LOOP4   $LOOW8 $LOW04 $LOW14 $LOW24 $LP6   $LST04
0E28 A 09EB A 0DA4 A 0E6B A 1097 A 0EAC A 0EAD A 0EAE A 0FC9 A 0EAF A

$LST14   $LST24   $M1%    $M2%    $MAIN%   $MAN18 $MASK7 $MERR6 $MERR> $MG3
0EB0 A 0EB1 A 0908 A 0916 A 07C1 A 10DF A 1063 A 0FE2 A 1340 A 0DFC A

$MIN1.   $MINU-   $MINU.   $MPS4   $MPY-   $MPY1-   $NAME.   $NERR& $NEXT3 $NK2;
0C33 A 0B99 A 0C32 A 0E69 A 0BBB A 0BBF A 0C51 A 09C0 A 0DF5 A 127D A

$NLCL3   $NO%     $NOEX& $NOPR;   $NOT.   $NOUN.   $NOX5   $NP%    $NXT-   $NXT4
0E12 A 08D8 A 09BA A 11CD A 0C30 A 0C19 A 0F77 A 094C A 0B72 A 0EA4 A

$NXTA0   $NXTB0   $O1X18   $O1X28   $O1X38   $O1X8   $OE%    $OP-    $OR-    $OR<
0D37 A 0D38 A 10A9 A 10B1 A 10AF A 10A8 A 08E3 A 0B8B A 0BCC A 12AE A

$OV&     $PGBF*   $PLUS-   $PMRE-   $PRM;    $PRMP0   $PROM;   $PT3    $PTR+   $PTR1+
09B7 A 0AD3 A 0B8C A 0BAD A 11C7 A 13FB A 11F7 A 0DF6 A 0B09 A 0B0A A

$PTRL+   $PUT18   $PUT28   $PUT38   $ONXT0   $QUOT.   $REL-    $REL5   $REL9   $RELT8
0B0B A 10BF A 10C5 A 10C3 A 0D39 A 0C39 A 0BDF A 0F7E A 1092 A 1088 A

$REND0   $RET1.   $RET8   $RETC;   $RM3    $ROV0   $RSE0    $RTB3   $RTS?   $SAME(
0D29 A 0C13 A 10D1 A 1249 A 0DF9 A 0D23 A 0CE5 A 0DFA A 1365 A 0A5F A

$SERC$   $SETB0   $SORF/   $STR13   $STRT3   $SYRE.   $T0/    $T0>   $T1*    $T1/
07F4 A 0D2F A 0C81 A 0D98 A 0D94 A 0C64 A 0CC3 A 133C A 0AD2 A 0CC4 A

$TAB1;   $TAB;    $TEMP8   $TEST.   $TMP"    $TMP$   $TMP%   $TMP(   $TMP9   $TMP<
1228 A 121F A 10B3 A 0BF3 A 0767 A 0862 A 08D7 A 0A62 A 114B A 12F0 A

$TR20   $TRYI6   $TSEC6   $TTL#   $TTL%   $SUM.    $UNOT.   $UOP.   $VAL5   $VERR6
13FA A 0FDD A 0FDA A 07A1 A 092F A 0C1C A 0C17 A 0C1F A 0F7D A 0FD4 A

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\$WORD2 \$WRD8 \$X. \$X2038 \$XARGS \$XERR- \$XERR5 \$XFLA6 \$XOK6 \$XR34
0D8C A 1091 A 0C4C A 0866 A 07C4 A 0BAA A 0F8C A 1011 A 0FC3 A 0EB4 A

ABST ACTR ARERR AMAX ASCII ASECT ASMDIR ASSIGN B1EQ1 BADSTB
0021 B 0056 B 0F86 A 0059 B 0A89 A 0A41 A 0AD4 A 0B28 A 0004 A 1699 A

BASE BASEA BASEB BCTR BEGP34 BLANK BLANKS BLDDIR BLDNAM BMAY
0060 B 0063 B 0066 B 0057 B 08B2 A 0034 B 0048 B 0C90 A 0C82 A 005A B

BSECT CAND CAT CDIV CHARX CKPNCH CLOSEO CLOSET CMINUS CMPY
0A50 A 0053 B 0032 B 0035 B 0044 B 12BB A 001D B 001C B 0051 B 003C B

CNAM0 CNAM1 CNOT COLAN COMMA COR CPLUS CR CZERO DBGVER
0090 B 0091 B 0052 B 004B B 004F B 0054 B 0050 B 0047 B 0038 B 0001 A

DBWIN DEM DIREND DISER DITBL2 DITBLB DITBLF DITBLD DIVD DOLLAR
0F5F A 1347 A 07CE A 0D3B A 156C A 1406 A 0D51 A 0D50 A 000E B 004E B

DOT DOTASN DSKERR DSKIN DSKOBJ DSKTMP EC ECHOGC ELIM ELSE
004A B 0B47 A 1343 A 001F B 001E B 0020 B 0089 B 0014 B 0008 A 09BD A

END ENDBUF ENDIF ENDP1 ENDP2 ENDP3 ENDP4 ENDPCH ENDST EQUAL
0867 A 0931 A 09CA A 0883 A 08A9 A 08DB A 092A A 12E2 A 07D1 A 004C B

ERBUF ERDEB ERBAS ERLST ERRMSG ERROR ERRPT ERRST EXP EXP4
13E8 A 0098 B 0055 B 008F B 114C A 13B7 A 008B B 07C9 A 0B5D A 1035 A

EXP8 EXPABS EXPFRM EXPP EXPP1 EXPP2 EXPP3 EXPP4 EXPP7 EXPPD
1037 A 102F A 1043 A 1032 A 1039 A 103B A 103D A 103F A 1041 A 007B B

EXPREL EXPVAL EXT0 FORM FORMB FORMBN FORMM FORMPT FORMT FORMTN
007C B 007A B 0A54 A 09D5 A 0075 B 0078 B 0077 B 0074 B 0076 B 0079 B

FORMV FRMREL GADR GADRI GADRIX GADRX GCOMMA GCSTRG GETC GFORM
0A3E A 0A40 A 0F8E A 0F8F A 0F92 A 0F91 A 1324 A 0D7C A 000F B 0C71 A

GITEM GLBUF GLOBL GNC GNCVC GNSTRG GNVC GSIZE GSTCON GSYM
0BEC A 0DFE A 0A63 A 124B A 124E A 0D52 A 123E A 0753 A 0D7F A 0C6F A

HEX20 HEX2A HEX2F HEX30 HEX37 HEX39 HEX3F HEX40 HEX400 HEX46
0034 B 003C B 0035 B 0038 B 0039 B 0036 B 003B B 0032 B 003D B 0037 B

HEX5A HEX5F HEX760 HEX7D HEX7E HEX7F HEXD0A HEXF HSPR HSPRT
0033 B 123A A 0768 A 123B A 0EB3 A 003A B 1084 A 0853 A 0096 B 001A B

IC1 IC10 IC11 IC12 IC12A IC13 IC13A IC14 IC15 IC16
0EB6 A 0F17 A 0F22 A 0F34 A 0F38 A 0F40 A 0F3E A 0F44 A 0F46 A 0F49 A

IC16A IC17 IC2 IC3 IC4 IC5 IC5A IC6 IC7 IC7A
0F4C A 0F50 A 0ECA A 0ED5 A 0ED1 A 0ED9 A 0EDB A 0EDE A 0EE3 A 0EEE A

IC8 IC9 ICLASS IDSKIN IDSKTM IF IFBYP IFMODE IFPTR IFPTRA
0EFB A 0F0A A 0073 B 0094 B 0095 B 09A3 A 1306 A 0070 B 006D B 006E B

IFSKIP IFSTAT IFTAB IFTBL INABS INBUF INBUFB INBUFE INDEV INERR
1309 A 006F B 070F A 09D4 A 07CB A 06A0 A 0012 B 0013 B 0089 B 0F7F A

INERR1 INITOR INOUT INPTR IREL ITREL ITVAL IVAI K1 K11
0F80 A 1285 A 07CC A 005E B 0F33 A 0087 B 0086 B 0072 B 0026 B 0025 B

K15 K16 K2 K255 K256 K3 K4 K6 K639 K7
002D B 0041 B 0040 B 0024 B 003F B 0027 B 002C B 0028 B 137A A 002A B

IMPASM8K

K9	K9	KM129	KM41	KM57	KM65	LABEL	LABST	LBLPT	LCNT1
0029 B	002B B	1014 A	1234 A	1235 A	1236 A	0B0C A	0769 A	008A B	008C B
LCNT2	LCNT2A	LCPTR	LEAD	LEAD8	LEZ	LINIT	LIST	LISTMD	LOCAL
008D B	123D A	005F B	12E6 A	12E9 A	000B A	0015 B	0AC2 A	008E B	0A76 A
LOCCTR	LOCREG	LPAREN	MANYNL	MAPDEB	MAPDIR	MAPLIN	MAPSOR	MAXR1	MERROR
005C B	006C B	0046 B	10D2 A	0099 B	1403 A	0E05 A	0E53 A	0A58 A	0F88 A
MESS	MOFLAG	MSGBEG	MSGEP	MSGNOE	MSGNXT	MSGOCK	MSGP	MSGSOV	MSGTAB
001B B	006A B	0956 A	0974 A	099B A	0967 A	0994 A	0979 A	097B A	1151 A
MSGTO	MULT	NAM0	NAM1	NAM2	NEW1	NEWASM	NEWLIN	NEXT	NEXTA
0083 A	000D B	007D B	007E B	007F B	0733 A	076A A	10E3 A	0062 B	0065 B
NEXTB	NEXTLB	NEXTST	NOCOM	NOLIST	NOMAP	NZ	O12B	O1B	O1CH
0068 B	07E0 A	07D3 A	0092 B	0091 B	0093 B	0005 A	10CD A	10B9 A	10BA A
O2B	O2CH	O4B	O6B	OBJCK	OBJMOD	OBJPT1	OBJPT2	OBJPTR	OBJREC
10B7 A	10E4 A	10B6 A	10B5 A	0936 A	0090 B	1304 A	1305 A	1303 A	12F1 A
ODD	OEPM	OGLOB	OHEX	OHEXIF	OIBREP	OIBUF	OLAST	OMAP	OMAPNR
0003 A	0937 A	0D8E A	10A5 A	109D A	110A A	118E A	08DA A	0D92 A	0D97 A
OMSG	ONLMSG	OOREC	OOWORD	OPGSTR	OPTRS	OSPDEC	OUTWRD	OVAL	P
10EB A	10EA A	12A2 A	1294 A	10F6 A	0943 A	1313 A	1065 A	1093 A	0002 A
P1P2	P2P1	PAGE	PASS	PASS1	PASS2	PASS4	PGRL	PGSTRG	PINIT
1310 A	130D A	0A97 A	005D B	13FC A	13FE A	1401 A	0071 B	06F0 A	07A2 A
PNCHMD	PR2PTR	PRCTRL	PREPLB	PRMPT1	PRMPT2	PROMPT	PTABF	PTABL	PTREND
000C A	1109 A	134F A	0B59 A	125C A	125A A	1263 A	1012 A	1013 A	1699 A
PTRTAB	PUTC	QERROR	QUOTE	R0	R1	R2	R3	RDCRD	RDSKIN
156C A	0010 B	0F84 A	0045 B	0000 A	0001 A	0002 A	0003 A	0011 B	0018 B
RDSKTM	RDTTY	READ	RELTB	REPERR	RESETP	RPAREN	S	SCANST	SECT
0019 B	11F8 A	11BB A	1098 A	1114 A	0D90 A	0043 B	8000 A	0DA3 A	006B B
SEMI	SHIFT	SHLIN	SIZE4	SIZE8	SOUCK	SPACE	SPADR	START	STBAS
0049 B	12AF A	004D B	FFFF A	0001 A	0935 A	0AAE A	1015 A	072C A	16C1 A
STPDEF	STPT	STREL	STSER	STTOP	STVAL	TCTR	TITLE	TLAST	TMAX
0083 B	0085 B	0084 B	0CDE A	1FFF A	0082 B	0059 B	0AD8 A	08D9 A	005B B
TOP	TOPA	TOPB	TSECT	TTLBUF	TYPMOD	VEERROR	WDSKOB	WDSKTM	WORD
0061 B	0064 B	0067 B	0A52 A	0719 A	0097 B	0F8A A	0017 B	0016 B	0A80 A
WORD3	WORD4	WORD5	WORD6	X1000	X2020	X2031	X4000	X6666	X7FFF
12F3 A	12F4 A	12F5 A	12F6 A	003E B	0DF3 A	092E A	0EB5 A	0031 B	0EAB A
X8000	X8004	XARGCK	XERR1	XERROR	XF000	FFF00	FFFF0	FFF7	FFFB
0030 B	1293 A	1101 A	07C7 A	07C6 A	0C6E A	0042 B	002E B	002F B	0D3A A
XINOK	Z	ZERO							
0069 B	0001 A	0023 B							

E9B0 F4BB

PROMP

PROMP

REVISION:-G 05/16/74
PROMP 00308B 08/07/74

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1 0000 .TITLE PROMP, '00308B 08/07/74'
2 0000 ;
3 0000 ; CONDITIONAL CODES FOR THE BOC INSTRUCTION
4 0000 ;
5 0000 0001 A ZRO = 1
6 0000 0003 A ODD = 3
7 0000 0004 A BIT1 = 4
8 0000 0005 A NZRO = 5
9 0000 000B A NEG = 11
10 0000 000C A POA = 12
11 0000 ;
12 0000 ; EXPRESSIONS FOR CARD READER I/O
13 0000 ;
14 0000 0001 A STATUS = 1
15 0000 0002 A STNDRN = 2
16 0000 0010 A CRANDP = 2*8

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17 0000 .PAGE
18 0000 ;
19 0000 .TSECT
20 0000 0250 T .=.+0250
21 0250 8938 A START1: LD 2,ADBASE
22 0251 8D38 A LD 3,CPAD
23 0252 0410 A RIN GPCS
24 0253 4801 A AISZ 0,1
25 0254 2E47 A JSR @LINITA(2)
26 0255 2E45 A JSR @STYPE(2)
27 0256 04DA T .WORD TPAK1
28 0257 8620 A LD 1,N256(2)
29 0258 A658 A ST 1,LOW(2)
30 0259 CA20 A ADP 2,N256(2)
31 025A A659 A ST 1,1+LOW(2)
32 025B ;
33 025B 892D A START: LD 2,ADBASE
34 025C 4CFF A LI 0,-1 ; CLEAR BUFFER MEMORY WITH -1
35 025D 8620 A LD 1,N256(2)
36 025E 8E3C A LD 3,ADHI(2)
37 025F 8A3B A LD 2,ADLO(2)
38 0260 A200 A ST 0,(2)
39 0261 A300 A ST 0,(3)
40 0262 4A01 A AISZ 2,1
41 0263 4B01 A AISZ 3,1
42 0264 49FF A AISZ 1,-1
43 0265 21FA A JMP -5
44 0266 ;
45 0266 8922 A TSTOPT: LD 2,ADBASE
46 0267 2E45 A JSR @STYPE(2) ; GET OUTPUT OPTION
47 0268 0525 T .WORD TPAK6
48 0269 4D00 A LI 1,0
49 026A 2E40 A JSR @SGETCO(2)
50 026B 21FA A JMP TSTOPT
51 026C F216 A SKNE 0,CCR(2)
52 026D 2103 A JMP +4
53 026E 5D08 A SHL 1,8
54 026F 3100 A RADD 0,1
55 0270 21F9 A JMP -6
56 0271 F62B A SKNE 1,OM(2)
57 0272 263D A JMP @SPAPOM(2)

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PROMP

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58 0273 F62D A      SKNF      1,BC(2)
59 0274 2103 A      JMP        .+4
60 0275 F62C A      SKNE      1,PN(2)
61 0276 2101 A      JMP        .+2
62 0277 21EE A      JMP        TSTOPT
63 0278 A650 A      ST         1,MODE(2)
64 0279 2E45 A $1:   JSR        @STYPE(2)      ; GET INPUT OPTION
65 027A 04F3 T      .WORD      TPAK2
66 027B 2E40 A $2:   JSR        @SGETCO(2)
67 027C 21FC A      JMP        $1
68 027D F216 A      SKNE      0,CCR(2)
69 027E 2107 A      JMP        .+4
70 027F 5D00 A      SHL        1,8
71 0280 3100 A      RADD       0,1
72 0281 21F9 A      JMP        $2
73 0282 F620 A      SKNF      1,CR(2)
74 0283 2107 A      JMP        SETCR
75 0284 F620 A      SKNE      1,PT(2)
76 0285 2100 A      JMP        SETPT
77 0286 F62A A      SKNF      1,ME(2)
78 0287 2161 A      JMP        MEM
79 0288 21F0 A      JMP        $1
80 0289 0650 T ADRASE: .WORD      PBPAGE
81 028A 0760 A CPAD:  .WORD      0760
82 028B 0018 A GPCS   =          018

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83 028B          .PAGE      'READ CARD RLM INTO BUFFERS'
84 028B          ;
85 028B 2E45 A SETCR: JSR        @STYPE(2)
86 028C 054E T      .WORD      TPAK9
87 028D 2E45 A      JSR        @STYPE(2)
88 028E 0509 T      .WORD      TPAK4
89 028F 2E42 A CRIN: JSR        @SRDCRD(2)
90 0290 08B2 T      .WORD      BUF1
91 0291 2E43 A      JSR        @SCHTQA(2)
92 0292 08B2 T      .WORD      BUF1
93 0293 2E44 A      JSR        @SIFFEQ(2)
94 0294 08B2 T      .WORD      BUF1
95 0295 06F3 T      .WORD      ASC8
96 0296 029C T      .WORD      LDDATA
97 0297 2E44 A      JSR        @SIFFEQ(2)
98 0298 08B2 T      .WORD      BUF1
99 0299 0667 T      .WORD      ASCC
100 029A 0317 T      .WORD      STOPT
101 029B 21F3 A      JMP        CRIN
102 029C          ;
103 029C 8E38 A LDDATA: LD        3,ADBUF1(2)
104 029D 2E41 A      JSR        @SAHER(2)
105 029E 0225 A      SUB        0,N8004(2)
106 029F A24F A      ST         0,LENGTH(2)
107 02A0 4B08 A      AISZ       3,8
108 02A1 2E41 A      JSR        @SAHER(2)
109 02A2 6221 A      AND        0,NIFF(2)
110 02A3 E21F A      SKG        0,NFF(2)
111 02A4 2101 A      JMP        .+2
112 02A5 4801 A      AISZ       0,1
113 02A6 C23B A      ADD        0,ADLO(2)
114 02A7 A24E A      ST         0,ADDR(2)
115 02A8 4B08 A      AISZ       3,8
116 02A9 2E41 A      JSR        @SAHER(2)
117 02AA 292D A      JSR        STDATA
118 02AB 7E4F A      DSZ        LENGTH(2)

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PROMP

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110 02AC 21FC A      JMP      .-3
120 02AD 21F1 A      JMP      CRIN

121 02AE              .PAGE    'READ PAPER TAPE RLM INTO BUFFERS'
122 02AE              ;
123 02AE 2E45 A SETPT: JSR      @STYPE(2)
124 02AF 0511 T      .WORD    TPAK5
125 02B0 2E4B A PTIN: JSR      @GETC(2)
126 02B1 F213 A      SKNE     0,N2(2)      ; TEST FOR START OF TEXT
127 02B2 2101 A      JMP      .+2
128 02B3 21FC A      JMP      .-3
129 02B4 2E4B A      JSR      @GETC(2)
130 02B5 F21E A      SKNE     0,NC0(2)      ; TEST FOR END RECORD
131 02B6 217F A      JMP      SETOFF
132 02B7 F21D A      SKNE     0,N80(2)      ; TEST FOR DATA RECORD
133 02B8 2101 A      JMP      .+2
134 02B9 21F6 A      JMP      PTIN
135 02BA 2E4B A      JSR      @GETC(2)
136 02BB 48FC A      AISZ     0,-4
137 02BC A24F A      ST       0,LENGTH(2)
138 02BD 4D05 A      LI       1,5
139 02BE 2E4B A      JSR      @GETC(2)
140 02BF 49FF A      AISZ     1,-1
141 02C0 21FD A      JMP      .-2
142 02C1 3181 A      RCPY     0,1
143 02C2 2E4B A      JSR      @GETC(2)
144 02C3 5D08 A      SHL      1,8
145 02C4 3100 A      RADD     0,1
146 02C5 6621 A      AND      1,NIFF(2)
147 02C6 F61F A      SKG      1,NFF(2)
148 02C7 2101 A      JMP      .+2
149 02C8 4901 A      AISZ     1,1
150 02C9 C63B A      ADD      1,ADLO(2)
151 02CA A64E A      ST       1,ADDR(2)
152 02CB 4D04 A      LI       1,4
153 02CC 2E4B A      JSR      @GETC(2)
154 02CD 49FF A      AISZ     1,-1
155 02CE 21FD A      JMP      .-2
156 02CF              ;
157 02CF 2E4B A LP1:  JSR      @GETC(2)
158 02D0 3181 A      RCPY     0,1
159 02D1 2E4B A      JSR      @GETC(2)
160 02D2 5D08 A      SHL      1,8
161 02D3 3400 A      RADD     1,0
162 02D4 2903 A      JSR      STDATA
163 02D5 7E4F A      DSZ      LENGTH(2)
164 02D6 21F3 A      JMP      LP1
165 02D7 21D8 A      JMP      PTIN
166 02D8              ;
167 02D8 B24E A STDATA: ST      0,@ADDR(2)
168 02D9 7A4E A      ISZ      ADDR(2)
169 02DA 823C A      LD       0,ADHI(2)
170 02DB 7A4E A      ISZ      ADDR(2)
171 02DC F24E A      SKNE     0,ADDR(2)
172 02DD 0200 A      RTS
173 02DE 7E4E A      DSZ      ADDR(2)
174 02DF 8238 A      LD       0,ADHI(2)
175 02E0 F24E A      SKNE     0,ADDR(2)
176 02E1 2101 A      JMP      .+2
177 02E2 0200 A      RTS
178 02E3 823B A      LD       0,ADLO(2)
179 02E4 A24E A      ST       0,ADDR(2)

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180 02E5 0200 A      RTS
181 02E6              ;
182 02E6 2E45 A SETOFF: JSR    @STYPE(2)
183 02E7 052F T      .WORD    TPAK7
184 02E8 212E A      JMP     $TOPT

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185 02E9              .PAGE    'MOVE MEMORY INPUT INTO BUFFERS'
186 02F9              ;
187 02F9 2E45 A MEM:   JSR     @STYPE(2)
188 02EA 04FD T      .WORD    TPAK3
189 02EB 2925 A      JSR     ZROLMT
190 02EC 2E40 A LP2:   JSR     @SGETCO(2)
191 02ED 21FB A      JMP     MEM
192 02EE F21A A      SKNF    0,COL(2)
193 02EF 2102 A      JMP     .+3
194 02F0 2918 A      JSR     STOLMT
195 02F1 21FA A      JMP     LP2
196 02F2 8E3A A      LD      3,ADLMT(2)
197 02F3 2E41 A      JSR     @SAHEB(2)
198 02F4 A252 A      ST      0,SLO(2)
199 02F5 291B A      JSR     ZROLMT
200 02F6 2E40 A LP4:   JSR     @SGETCO(2)
201 02F7 21F1 A      JMP     MEM
202 02F8 F216 A      SKNE    0,CCR(2)
203 02F9 2102 A      JMP     .+3
204 02FA 290E A      JSR     STOLMT
205 02FB 21FA A      JMP     LP4
206 02FC 8E3A A      LD      3,.DLMT(2)
207 02FD 2E41 A      JSR     @SAHEB(2)
208 02FE A253 A      ST      0,SHI(2)
209 02FF 823B A      LD      0,ADLO(2)
210 0300 A24. A      ST      0,ADDR(2)
211 0301 8E52 A      LD      3,SLO(2)
212 0302 8300 A      LD      0,(3)
213 0303 29D4 A      JSR     $TDATA
214 0304 FE53 A      SKNE    3,SHI(2)
215 0305 2111 A      JMP     $TOPT
216 0306 4B01 A      AISZ    3,1
217 0307 21FA A      JMP     .-5
218 0308 21F9 A      JMP     .-6

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219 0309              .PAGE
220 0309              ;
221 0309 8E55 A STOLMT: LD      3,1+LMT(2)
222 030A AE54 A      ST      3,LMT(2)
223 030B 8E56 A      LD      3,2+LMT(2)
224 030C AE55 A      ST      3,1+LMT(2)
225 030D 8E57 A      LD      3,3+LMT(2)
226 030E AE56 A      ST      3,2+LMT(2)
227 030F A257 A      ST      0,3+LMT(2)
228 0310 0200 A      RTS
229 0311              ;
230 0311 4D00 A ZROLMT: LI      1,0
231 0312 A654 A      ST      1,LMT(2)
232 0313 A655 A      ST      1,1+LMT(2)
233 0314 A656 A      ST      1,2+LMT(2)
234 0315 A657 A      ST      1,3+LMT(2)
235 0316 0200 A      RTS

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236 0317              .PAGE    'GET OUTPUT OPTIONS'

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PROMP

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237 0317 ;
238 0317 2E45 A STOPT: JSR @STYPE(2)
239 0318 055B T .WORD TPAK10 ; 'SET MODE'
240 0319 2E45 A JSR @STYPE(2)
241 031A 0564 T .WORD TPAK11
242 031B 2E45 A JSR @STYPE(2)
243 031C 0579 T .WORD TPAK15
244 031D 2E45 A JSR @STYPE(2)
245 031E 056C T .WORD TPAK12
246 031F 2E45 A JSR @STYPE(2)
247 0320 0573 T .WORD TPAK13
248 0321 2E45 A JSR @STYPE(2)
249 0322 0564 T .WORD TPAK11
250 0323 2E45 A JSR @STYPE(2)
251 0324 057C T .WORD TPAK16
252 0325 2E45 A JSR @STYPE(2)
253 0326 056C T .WORD TPAK12
254 0327 2E45 A JSR @STYPE(2)
255 0328 0576 T .WORD TPAK14
256 0329 2E45 A JSR @STYPE(2)
257 032A 052A T .WORD TPAK6A
258 032B 4D00 A LI 1,0
259 032C A651 A ST 1,OPTION(2)
260 032D A635 A ST 1,SMODE(2)
261 032E A636 A ST 1,LTS(2)
262 032F 2E40 A LP5: JSR @SGETCO(2)
263 0330 21E6 A JMP STOPT
264 0331 F216 A SKNE 0,CCR(2)
265 0332 2108 A JMP BYTOPT
266 0333 F205 A SKNE 0,TWO(2)
267 0334 21FA A JMP LP5
268 0335 F207 A SKNE 0,FOUR(2)
269 0336 2101 A JMP .+2
270 0337 21DF A JMP STOPT
271 0338 4CFF A LI 0,-1
272 0339 A235 A ST 0,SMODE(2)
273 033A 21F4 A JMP LP5
274 033B 2E45 A BYTOPT: JSR @STYPE(2)
275 033C 057F T .WORD TPAK17
276 033D 2E40 A LP6: JSR @SGETCO(2)
277 033E 21D8 A JMP STOPT
278 033F F216 A SKNE 0,CCR(2)
279 0340 213B A JMP PUTSEL
280 0341 8635 A TMODE: LD 1,SMODE(2)
281 0342 4900 A AISZ 1,0
282 0343 210E A JMP M512
283 0344 3181 A M256: RCPY 0,1
284 0345 5D08 A SHL 1,8
285 0346 2140 A JSR @SGETCO(2)
286 0347 21CF A JMP STOPT
287 0348 3100 A RADD 0,1
288 0349 F631 A SKNE 1,LL(2)
289 034A 210C A JMP SETLL
290 034B F632 A SKNE 1,LR(2)
291 034C 210C A JMP SETLR
292 034D F633 A SKNE 1,HL(2)
293 034F 210C A JMP SETHL
294 034F F634 A SKNE 1,HR(2)
295 0350 210C A JMP SETHR
296 0351 21E9 A JMP BYTOPT
297 0352 F22F A M512: SKNE 0,ASCL(2)
298 0353 210D A JMP SETL
299 0354 F230 A SKNE 0,ASCR(2)

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300 0355 210D A      JMP      SETH
301 0356 21E4 A      JMP      BYTOPT
302 0357           ;
303 0357 4C07 A SETLL: LI      0,X'07
304 0358 2105 A      JMP      .+6
305 0359 4C70 A SETLR: LI      0,X'70
306 035A 2103 A      JMP      .+4
307 035B 8223 A SETHL: LD      Q,NE00(2)
308 035C 2101 A      JMP      .+2
309 035D 8225 A SFTHR: LD      0,N8004(2)
310 035E 6A51 A      OR       0,OPTION(2)
311 035F A251 A      ST       0,OPTION(2)
312 0360 21DC A      JMP      LP6
313 0361           ;
314 0361 8103 A SETL:  LD      Q,H0707
315 0362 2101 A      JMP      .+2
316 0363 8102 A SETH:  LD      0,H7070
317 0364 21F9 A      JMP      SETHR+1
318 0365 0707 A H0707: .WORD   0707
319 0366 7070 A H7070: .WORD   0707

320 0367           .PAGE    'TAPE MESSAGES'
321 0367           ;
322 0367 0007 A HMES:  .WORD   7
323 0368 00A0 A      .WORD   X'A0,X'A0,X'E0,X'A0,X'A0,X'00
324 0369 00A0 A
325 036A 00F0 A
326 036B 00A0 A
327 036C 00A0 A
328 036D 0000 A
329 036E 0007 A LMES:  .WORD   7
330 036F 0080 A      .WORD   X'80,X'80,X'80,X'80,X'E0,X'00
331 0370 0080 A
332 0371 0080 A
333 0372 0080 A
334 0373 00E0 A
335 0374 0000 A
336 0375 0007 A RMES:  .WORD   7
337 0376 00E0 A      .WORD   X'E0,X'A0,X'E0,X'C0,X'A0,X'00
338 0377 00A0 A
339 0378 00E0 A
340 0379 00C0 A
341 037A 00A0 A
342 037B 0000 A

328 037C           .PAGE    'OUTPUT BC FROM TAPE ROUTINE'
329 037C           ;
330 037C 2E45 A PUTSEL: JSR     QSTYPE(2)
331 037D 0539 T      .WORD   TPAK8
332 037E 8251 A      LD       0,OPTION(2)
333 037F 1517 A      BOC      NZRO,WAIT
334 0380 8E3B A      LD       3,ADLO(2)
335 0381 2101 A      JMP      .+2
336 0382 8E3C A LOOP1: LD      3,ADHI(2)
337 0383 8620 A      LD       1,N256(2)
338 0384 4C01 A LOOP2: LI      0,1
339 0385 C300 A      ADD      0,(3)
340 0386 4B01 A      AISZ     3,1
341 0387 1505 A      BOC      NZRO,+.6
342 0388 49FF A      AISZ     1,-1
343 0389 21FA A      JMP      LOOP2

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344 038A FE38 A      SKNE    3,ADBUF1(2)
345 038B 210B A      JMP     WAIT
346 038C 21F5 A      JMP     LOOP1
347 038D EE3C A      SKG     3,ADHI(2)
348 038E 2105 A      JMP     .+6
349 038F 861F A      LD      1,NFF(2)
350 0390 5D08 A      SHL     1,8
351 0391 C651 A      ADD     1,OPTION(2)
352 0392 A651 A      ST      1,OPTION(2)
353 0393 2103 A      JMP     WAIT
354 0394 861F A      LD      1,NFF(2)
355 0395 A651 A      ST      1,OPTION(2)
356 0396 21EB A      JMP     LOOP1
357 0397 2E4B A WAIT: JSR     @GETC(2)
358 0398          ;
359 0398 8650 A TEST: LD      1,MODE(2)
360 0399 F62C A      SKNE    1,PN(2)
361 039A 2602 A      JMP     @SOUTPN(2)
362 039B 8651 A OUTPR: LD      1,OPTION(2)
363 039C 6617 A      AND     1,NF(2)
364 039D E614 A      SKG     1,N4(2)
365 039E 2109 A      JMP     CR1
366 039F 8E3B A      LD      3,ADLO(2)
367 03A0 2E4D A      JSR     @SROL8(2)
368 03A1 2030 A      JSR     BCTP
369 03A2 036E T      .WORD   LMES
370 03A3 036E T      .WORD   LMES
371 03A4 06B0 T      .WORD   LO-1
372 03A5 0FFF A      .WORD   X'FFF
373 03A6 8E3B A      LD      3,ADLO(2)
374 03A7 2E4D A      JSR     @SROL8(2)
375 03A8          ;
376 03A8 8651 A CR1:  LD      1,OPTION(2)
377 03A9 5DFC A      SHR     1,4
378 03AA A651 A      ST      1,OPTION(2)
379 03AB 6617 A      AND     1,NF(2)
380 03AC E614 A      SKG     1,N4(2)
381 03AD 2105 A      JMP     CR2
382 03AE 2923 A      JSR     BCTP
383 03AF 036E T      .WORD   LMES
384 03B0 0375 T      .WORD   RMES
385 03B1 06B0 T      .WORD   LO-1
386 03B2 0FFF A      .WORD   X'FFF
387 03B3          ;
388 03B3 0651 A CR2:  LD      1,OPTION(2)
389 03B4 5DFC A      SHR     1,4
390 03B5 A651 A      ST      1,OPTION(2)
391 03B6 6617 A      AND     1,NF(2)
392 03B7 E614 A      SKG     1,N4(2)
393 03B8 210B A      JMP     CR3
394 03B9 8635 A      LD      1,SMODE(2)
395 03BA A636 A      ST      1,LTSW(2)
396 03BB 8E3C A      LD      3,ADHI(2)
397 03BC 2E4D A      JSR     @SROL8(2)
398 03BD 2914 A      JSR     BCTP
399 03BE 0367 T      .WORD   HMES
400 03BF 036E T      .WORD   LMES
401 03C0 07B1 T      .WORD   HIGH
402 03C1 0FFF A      .WORD   X'FFF
403 03C2 8E3C A      LD      3,ADHI(2)
404 03C3 2E4D A      JSR     @SROL8(2)
405 03C4          ;
406 03C4 8651 A CR3:  LD      1,OPTION(2)

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PROMP

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407 03C5 5DFC A      SHR      1,4
408 03C6 6617 A      AND      1,NF(2)
409 03C7 F614 A      SKG      1,N4(2)
410 03C8 2107 A      JMP      CR4
411 03C9 8635 A      LD        1,SMODE(2)
412 03CA A636 A      ST        1,LTSW(2)
413 03CB 2906 A      JSR      BCTP
414 03CC 0357 T      .WORD    RMES
415 03CD 0375 T      .WORD    RMES
416 03CE 07B1 T      .WORD    HIGH
417 03CF 0FFF A      .WORD    X'FFF
418 03D0 ;
419 03D0 2E4B A CR4: JSR      @GETC(2)
420 03D1 263E A      JMP      @ASTART(2)

421 03D2 .PAGE      'OUTPUT BC FROM TAPE ROUTINE'
422 03D2 ;
423 03D2 4700 A BCTP: PULL     3
424 03D3 8235 A      LD        0,SMODE(2)
425 03D4 4801 A      AISZ     0,1
426 03D5 2105 A      JMP      .+6
427 03D6 4B02 A      AISZ     3,2
428 03D7 8236 A      LD        0,LTSW(2)
429 03D8 1507 A      BOC      NZRO,...3
430 03D9 2053 A      JSR      S40N
431 03DA 4BFF A      AISZ     3,-1
432 03DB AE4F A      ST        3,LENGTH(2)
433 03DC 9E4H A $12: LD        3,@LENGTH(2)
434 03DD 8700 A      LD        1,(3)
435 03DE 7A4F A      ISZ      LENGTH(2)
436 03DF F620 A      SKNE     1,N256(2) ; TEST FOR START BC
437 03E0 2100 A      JMP      CR6
438 03E1 FE24 A      SKNE     3,NFFF(2) ; TEST FOR END OF TEXT
439 03E2 211C A      JMP      CR7
440 03E3 2107 A      JMP      .+3
441 03E4 8300 A      LD        0,(3)
442 03E5 2E4A A      JSR      @PUTC(2)
443 03E6 4B01 A      AISZ     3,1
444 03E7 49FF A      AISZ     1,-1
445 03E8 21F0 A      JMP      .-4
446 03E9 21F2 A      JMP      $12
447 03EA ;
448 03EA 8236 A CR6: LD        0,LTSW(2)
449 03EB 4801 A      AISZ     0,1
450 03EC 2107 A      JMP      .+3
451 03ED 4901 A      AISZ     1,1
452 03EE 210C A      JMP      CR6A
453 03EF 4C00 A      LI        0,0
454 03F0 A237 A      ST        0,CKSM(2)
455 03F1 2939 A      JSR      S160N ; SEND LEADER
456 03F2 4CFF A      LI        0,-1
457 03F3 4901 A      AISZ     1,1
458 03F4 2107 A      JMP      .+3
459 03F5 8300 A CBACK: LD        0,(3)
460 03F6 5000 A      CAI        0,0 ; COMPLEMENT BEFORE OUTPUT
461 03F7 2C4A A      JSR      @PUTC(2)
462 03F8 5000 A      CAI        0,0
463 03F9 C237 A      ADD        0,CKSM(2)
464 03FA A237 A      ST        0,CKSM(2)
465 03FB 4B01 A CR6A: AISZ     3,1
466 03FC 49FF A      AISZ     1,-1 ; OUTPUT START OF TEXT
467 03FD 21F7 A      JMP      CBACK

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468 03FE 2100 A      JMP      $12
469 03FF          ;
470 03FF 8235 A CR7:  LD      0,SMODE(2)
471 0400 4801 A      AISZ    0,1
472 0401 2103 A      JMP      .+4
473 0402 8236 A      LD      0,LTSW(2)
474 0403 4801 A      AISZ    0,1
475 0404 264F A      JMP      @LENGTH(2)
476 0405 4CFF A      LI      0,-1
477 0406 2E4A A      JSR      @PUTC(2)
478 0407 2925 A      JSR      S40N
479 0408 8237 A      LD      0,CKSM(2)
480 0409 2909 A      JSR      BINASC
481 040A 040E T CKMTBL: . = .+4
482 040E 0000 A      .WORD    0
483 040F 2E45 A      JSR      @STYPE(2)
484 0410 040A T      .WORD    CKMTBL
485 0411 2919 A      JSR      S160N
486 0412 264F A      JMP      @LENGTH(2)
487 0413          ;
488 0413 4700 A BINASC: PULL    3
489 0414 4D04 A      LI      1,4
490 0415 5804 A RL:    ROL     0,4
491 0416 A237 A      ST      0,CKSM(2)
492 0417 6217 A      AND     0,NF(2)
493 0418 E22E A      SKG     0,BIN9(2)
494 0419 2107 A      JMP      C09
495 041A 4837 A      AISZ    0,037
496 041B A300 A STTBL: ST      0,(3)
497 041C 4B01 A      AISZ    3,1
498 041D 8237 A      LD      0,CKSM(2)
499 041E 49FF A      AISZ    1,-1
500 041F 21F5 A      JMP      RL
501 0420 2301 A      JMP      1(3)
502 0421          ;
503 0421 4830 A C09:  AISZ    0,030
504 0422 21F8 A      JMP      STTBL

505 0423          .PAGE    'ROTATION AND LEADER/TRAILER'
506 0423          ;
507 0423          ;      THIS SUBROUTINE ROTATES A 256 WORDS
508 0423          ;      ARRAY 8 BITS TO THE LEFT
509 0423          ;
510 0423 8620 A ROL8:  LD      1,N256(2)
511 0424 8300 A      LD      0,(3)
512 0425 5808 A      ROL     0,8
513 0426 A300 A      ST      0,(3)
514 0427 4B01 A      AISZ    3,1
515 0428 49FF A      AISZ    1,-1
516 0429 21FA A      JMP      .-5
517 042A 0200 A      RTS
518 042B          ;
519 042B          ;      THIS SUBROUTINE SENDS OUT NULLS
520 042B          ;      FOR LEADER/TRAILER
521 042B          ;
522 042B 2900 A S160N: JSR      .+1
523 042C 2900 A      JSR      .+1
524 042D A64E A S40N: ST      1,ADDR(2)
525 042E 4D28 A      LI      1,40
526 042F 4C00 A      LI      0,0
527 0430 2E4A A      JSR      @PUTC(2)
528 0431 49FF A      AISZ    1,-1

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529 0432 21FD A      JMP      .-2
530 0433 864E A      LD        1,ADDR(2)
531 0434 0200 A      RTS
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532 0435          .PAGE      'OUTPUT PN FROM TAPE ROUTINE'
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533 0435          ;
534 0435 8651 A OUTPN: LD      1,OPTION(2)
535 0436 6617 A      AND      1,NF(2)
536 0437 E614 A      SKG      1,N4(2)
537 0438 2109 A      JMP      CN1
538 0439 8E3B A      LD        3,ADLO(2)
539 043A 2E4D A      JSR      @SROL8(2)
540 043B 292F A      JSR      PNTP
541 043C 036E T      .WORD    LMES
542 043D 036E T      .WORD    LMES
543 043E 06B0 T      .WORD    LO-1
544 043F 0FFF A      .WORD    X'FFF
545 0440 8E3B A      LD        3,.DLO(2)
546 0441 284D A      JSR      @TROL8(2)
547 0442          ;
548 0442 8651 A CN1:  LD      1,OPTION(2)
549 0443 5BFC A      SHR      1,4
550 0444 A651 A      ST        1,OPTION(2)
551 0445 6617 A      AND      1,NF(2)
552 0446 C614 A      SKG      1,N4(2*)
553 0447 2107 A      JMP      CN2
554 0448 2922 A      JSR      PNTP
555 0449 036E T      .WORD    LMES
556 044A 0375 T      .WORD    RMES
557 044B 06B0 T      .WORD    LO-1
558 044C 0FFF A      .WORD    X'FFF
559 044D 8635 A      LD        1,SMODE(2)
560 044E A636 A      ST        1,LTSW(2)
561 044F          ;
562 044F 8651 A CN2:  LD      1,OPTION(2)
563 0450 5BFC A      SHR      1,4
564 0451 A651 A      ST        1,OPTION(2)
565 0452 6617 A      AND      1,NF(2)
566 0453 E614 A      SKG      1,N4(2)
567 0454 2109 A      JMP      CN3
568 0455 8E3C A      LD        3,ADHI(2)
569 0456 2E4D A      JSR      @SROL8(2)
570 0457 2913 A      JSR      PNTP
571 0458 0367 T      .WORD    HMES
572 0459 036E T      .WORD    LMES
573 045A 07B1 T      .WORD    HIGH
574 045B 0FFF A      .WORD    X'FFF
575 045C 8E3C A      LD        3,ADHI(2)
576 045D 2E4D A      JSR      @SROL8(2)
577 045E          ;
578 045E 8651 A CN3:  LD      1,OPTION(2)
579 045F 5BFC A      SHR      1,4
580 0460 6617 A      AND      1,NF(2)
581 0461 E614 A      SKG      1,N4(2)
582 0462 2601 A      JMP      @SCR4(2)
583 0463 8635 A      LD        1,SMODE(2)
584 0464 A636 A      ST        1,LTSW(2)
585 0465 2905 A      JSR      PNTP
586 0466 0367 T      .WORD    HMES
587 0467 0375 T      .WORD    RMES
588 0468 07B1 T      .WORD    HIGH
589 0469 0FFF A      .WORD    X'FFF
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590 046A 2601 A      JMP      @SCR4(2)

591 046B              .PAGE
592 046B              ;
593 046B 4700 A      PNTTP:  PULL      3
594 046C 8235 A      LD          0,SMODE(2)
595 046D 4801 A      AISZ       0,1
596 046E 2104 A      JMP          ,+5
597 046F 8236 A      LD          0,LTSW(2)
598 0470 4800 A      AISZ       0,0
599 0471 4801 A      AISZ       3,1
600 0472 4801 A      AISZ       3,1
601 0473 AE4F A      ST          3,LENGTH(2)
602 0474 29B8 A      JSR        S400N
603 0475 9E4F A      $13:      LD          3,@LENGTH(2)
604 0476 8700 A      LD          1,(3)
605 0477 7A4F A      ISZ        LENGTH(2)
606 0478 FE24 A      SKNE       3,NFFF(2)      ; TEST FOR END OF TEXT
607 0479 2109 A      JMP          CN7
608 047A F620 A      SKNE       1,N256(2)      ; TEST FOR START PN
609 047B 290F A      JSR        CN6
610 047C 2102 A      JMP          ,+3
611 047D 8300 A      LD          0,(3)
612 047E 2E4A A      JSR        @PUTC(2)
613 047F 4801 A      AISZ       3,1
614 0480 49FF A      AISZ       1,-1
615 0481 21FB A      JMP          ,+4
616 0482 21F2 A      JMP          $13
617 0483              =
618 0483 8235 A      CN7:      LD          0,SMODE(2)
619 0484 4801 A      AISZ       0,1
620 0485 2103 A      JMP          ,+4
621 0486 8236 A      LD          0,LTSW(2)
622 0487 4801 A      AISZ       0,1
623 0488 264F A      JMP          @LENGTH(2)
624 0489 29A1 A      JSR        S160N      ; SEND TRAILER
625 048A 264F A      JMP          @LENGTH(2)      ; RTS
626 048B              ;
627 048B 8236 A      CN6:      LD          0,LTSW(2)
628 048C 4800 A      AISZ       0,0
629 048D 2101 A      JMP          ,+2
630 048E 299C A      JSR        S160N      ; SEND LEADER
631 048F AF50 A      ST          3,MODE(2)
632 0490 2C3F A      CN6A:    JSR        @SCRLF(2)
633 0491 4C03 A      LI          0,8
634 0492 A24E A      ST          0,ADDR(2)
635 0493 4C42 A      LI          0,X'42      ; ASCII 'B'
636 0494 2E4A A      JSR        @PUTC(2)
637 0495 7A50 A      ISZ        MODE(2)
638 0496 9C50 A      LD          3,@MODE(2)
639 0497 5F08 A      SHL        3,8
640 0498 3C81 A      RCPY      3,0
641 0499 5F01 A      SHL        3,1
642 049A 1202 A      BOC        2, ,+3
643 049B 4C50 A      LI          0,X'50      ; ASCII 'P'
644 049C 2101 A      JMP          ,+2
645 049D 4C4E A      LI          0,X'4E      ; ASCII 'N'
646 049E 2E4A A      JSR        @PUTC(2)
647 049F 7E4E A      DSZ        ADDR(2)
648 04A0 21F7 A      JMP          ,+8
649 04A1 4C46 A      LI          0,X'46      ; ASCII 'F'
650 04A2 2E4A A      JSR        @PUTC(2)

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651 04A3 2E48 A      JSR      @SETLP(2)
652 04A4 2E49 A      JSR      @INTEST(2)      ; TEST FOR KB INTERRUPT
653 04A5 2102 A      JMP      .+3
654 04A6 49FF A      AISZ     1,-1
655 04A7 21E8 A      JMP      CN6A
656 04A8 0206 A      RTS      6

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657 04A9              .PAGE    'CARD RLM TO PAPER TAPE RLM CONVERSION'
658 04A9              ;
659 04A9 2E45 A      PAPRLM: JSR      @STYPE(2)
660 04AA 054E T      .WORD     TPAK9
661 04AB 2E45 A      JSR      @STYPE(2)
662 04AC 0539 T      .WORD     TPAK8
663 04AD 2E4B A      JSR      @GETC(2)      ; WAIT FOR KB INTERRUPT
664 04AE 2D2A A      JSR      @SS160N
665 04AF 2E42 A      JSR      @SRDCRD(2)
666 04B0 08B2 T      .WORD     BUF1
667 04B1 2E43 A      JSR      @SCHTOA(2)
668 04B2 08B2 T      .WORD     BUF1
669 04B3 823B A      LD        0,ADLO(2)
670 04B4 A24E A      ST        0,ADDR(2)
671 04B5 4C12 A      LI        0,18
672 04B6 .251 A      ST        0,OPTION(2)
673 04B7 8E38 A      LD        3,ADBUF1(2)
674 04B8 2E41. A     JSR      @SAHEB(2)
675 04B9 3181. A     RCPY     0,1
676 04BA 661F A      AND       1,NFF(2)
677 04BB 4902 A      AISZ     1,2
678 04BC A650 A      ST        1,MODE(2)
679 04BD 2101 .      JMP      .+2
680 04BE 2E41 .      JSR      @SAHEB(2)
681 04BF 824E A      ST        0,@ADDR(2)
682 04C0 7A4E A      ISZ      ADDR(2)
683 04C1 7C51 A      DSZ      OPTION(2)
684 04C2 21FB A      JMP      .-4
685 04C3 4C02 A      LI        0,2
686 04C4 2E4A A      JSR      @PUTC(2)
687 04C5 8E3B A      LD        3,ADLO(2)
688 04C6 8300 A      LD        0,(3)
689 04C7 2E46 A      JSR      @SPUT2C(2)
690 04C8 4B01 d      AISZ     3,1
691 04C9 7E50 A      DSZ      MODE(2)
692 04CA 21FB A      JMP      .-4
693 04CB 2E3F A      JSR      @SCRLF(2)
694 04CC 4C00 .      LI        0,0
695 04CD 4D05 A      LI        1,5
696 04CE 2E4A A      JSR      @PUTC(2)
697 04CF 49FF A      AISZ     1,-1
698 04D0 21DD A      JMP      .-2
699 04D1 8E3B A      LD        3,ADLO(2)
700 04D2 8300 A      LD        0,(3)
701 04B3 5CF4 A      SHR      0,12
702 04D4 48F4 A      AISZ     0,-12
703 04B5 21D9 A      JMP      PAPRLM+6
704 04D6 2E00 A      JSR      @SNULS(2)
705 04D7 2E48 A      JSR      @GETC(2)      ; WAIT FOR KB INTERRUPT
706 04D8 263E A      JMP      @ASTART(2)
707 04D9 042B T      @SS160N: .WORD    S160N

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708 04DA              .PAGE    'LIST OF MESSAGES'
709 04DA              ;

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710 04DA ;
711 04DA 0D0A A TPAK1: .WORD 0D0A
712 04DB 0D0A A .WORD 0D0A
713 04DC 0D0A A .WORD 0D0A
714 04DD 4E53 A .ASCII 'NSC IMP-16 FIRMWARE PAPER TAPE'
    04DE 4320 A
    04DF 494D A
    04E0 502D A
    04E1 3136 A
    04E2 2046 A
    04E3 4952 A
    04E4 4D57 A
    04E5 4152 A
    04E6 4520 A
    04E7 5041 A
    04E8 5045 A
    04E9 5220 A
    04EA 5441 A
    04EB 5045 A
715 04EC 2047 A .ASCII ' GENERATOR'
    04ED 454E A
    04EE 4552 A
    04EF 4154 A
    04F0 4F52 A
716 04F1 0D0A A .WORD 0D0A
717 04F2 0000 A .WORD 0
718 04F3 ;
719 04F3 ;
720 04F3 0D0A A TPAK2: .WORD 0D0A
721 04F4 494E A .ASCII 'INPUT DEVICE:'
    04F5 5055 A
    04F6 5420 A
    04F7 4445 A
    04F8 5649 A
    04F9 4345 A
    04FA 3A20 A
722 04FB 2020 A .WORD 02020
723 04FC 0000 A .WORD 0
724 04FD ;
725 04FD ;
726 04FD 0D0A A TPAK3: .WORD 0D0A
727 04FE 5350 A .ASCII 'SPECIFY MEMORY --'
    04FF 4543 A
    0500 4946 A
    0501 5920 A
    0502 4D45 A
    0503 4D4F A
    0504 5259 A
    0505 202D A
    0506 2D20 A
728 0507 2020 A .WORD 02020
729 0508 0000 A .WORD 0
730 0509 ;
731 0509 ;
732 0509 0D0A A TPAK4: .WORD 0D0A
733 050A 544F A .ASCII 'TO LOAD LM'
    050B 204C A
    050C 4F41 A
    050D 4420 A
    050E 4C4D A
734 050F 0D0A A .WORD 0D0A
735 0510 0000 A .WORD 0
736 0511 ;

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737 0511 ;
738 0511 0D0A A TPAK5: .WORD 0D0A
739 0512 4D41 A .ASCII 'MAKE TAPE READER READY'
    0513 4B45 A
    0514 2054 A
    0515 4150 A
    0516 4520 A
    0517 5245 A
    0518 4144 A
    0519 4552 A
    051A 2052 A
    051B 4541 A
    051C 4450 A
740 051D 0D0A A .WORD 0D0A
741 051E 544F A .ASCII 'TO LOAD LM'
    051F 204C A
    0520 4F41 A
    0521 4420 A
    0522 4C4D A
742 0523 0D0A A .WORD 0D0A
743 0524 0000 A .WORD 0
744 0525 ;
745 0525 ;
746 0525 0D0A A TPAK6: .WORD 0D0A
747 0526 0D0A A .WORD 0D0A
748 0527 4F55 & .ASCII 'OUTPUT'
    0528 5450 f
    0529 5554 A
749 052A 2054 A TPAK6A: .ASCII ' TYPE:'
    052B 5950 A
    052C 453A A
750 052D 2020 A .WORD 02020
751 052E 0000 A .WORD 0
752 052F ;
753 052F ;
754 052F 0D0A A TPAK7: .WORD 0D0A
755 0530 5455 A .ASCII 'TURN READER OFF'
    0531 524E A
    0532 2052 A
    0533 4541 A
    0534 4445 A
    0535 5220 A
    0536 4F46 A
    0537 4620 A
756 0538 0000 A .WORD 0
757 0539 ;
758 0539 ;
759 0539 0D0A A TPAK8: .WORD 0D0A
760 053A 5455 A .ASCII 'TURN PUNCH ON'
    053B 524E A
    053C 2050 A
    053D 554E A
    053E 4342 A
    053F 204F A
    0540 4E20 A
761 0541 0D0A A .WORD 0D0A
762 0542 4849 A .ASCII 'HIT ANY KEY TO START'
    0543 5420 A
    0544 414F A
    0545 5020 A
    0546 4B45 A
    0547 5920 A
    0548 544F A

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0549 2053 A
054A 5441 A
054B 5254 A
763 054C 0D0A A      .WORD 0D0A
764 054D 0000 A      .WORD 0
765 054E      ;
766 054E      ;
767 054E 0D0A A TPAK9: .WORD 0D0A
768 054F 4D41 A      .ASCII 'MAKE CARD READER READY'
0550 4B45 A
0551 2043 A
0552 4152 A
0553 4420 A
0554 5245 A
0555 4144 A
0556 4552 A
0557 2052 A
0558 4541 A
0559 4459 A
769 055A 0000 A      .WORD 0
770 055B      ;
771 055B      ;
772 055B 0D0A A TPAK10: .WORD 0D0A
773 055C 0D0A A      .WORD 0D0A
774 055D 5345 A      .ASCII 'SET MODE:'
055E 15420 A
055F 4D4F A
0560 4445 A
0561 3A20 A
775 0562 0D0A A      .WORD 0D0A
776 0563 0000 A      .WORD 0
777 0564 5441 A TPAK11: .ASCII 'TAPE FOR MM520'
0565 5045 A
0566 2046 A
0567 4F52 A
0568 204D A
0569 4D35 A
056A 3230 A
778 056B 0000 A      .WORD 0
779 056C 2050 A TPAK12: .ASCII ' PROM - TYPE'
056D 524F A
056E 4D20 A
056F 2D20 A
0570 5459 A
0571 5045 A
780 0572 0000 A      .WORD 0
781 0573 2032 A TPAK13: .ASCII ' 2'
782 0574 0D0A A      .WORD 0D0A
783 0575 0000 A      .WORD 0
784 0576 2034 A TPAK14: .ASCII ' 4'
785 0577 0D0A A      .WORD 0D0A
786 0578 0000 A      .WORD 0
787 0579 3320 A TPAK15: .ASCII '3 2K'
057A 324B A
788 057B 0000 A      .WORD 0
789 057C 3420 A TPAK16: .ASCII '4 4K'
057D 344B A
790 057E 0000 A      .WORD 0
791 057F      XCRLE: ;THIS WORD USED AS CONSTANT ELSEWHERE
792 057F 0D0A A TPAK17: .WORD 0D0A
793 0580 2042 A      .ASCII ' BYTE:'
0581 5954 A
0582 453A A

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794 0583 2020 A      .WORD 02020
795 0584 0000 A      .WORD 0

796 0585              .PAGE 'READ CARD ROUTINE'
797 0585              ;
798 0585 4C01 A INERR: LI 0,1
799 0586 0000 A      HALT          ; TRANSMISSION ERROR
800 0587 291C A      JSR OFFLN+2
801 0588              ;
802 0588 4C00 A FIRS2: LI 0,0
803 0589 A227 A      ST 0,FSTCD(2)
804 058A              ;
805 058A 8227 A RDCARD: LD 0,FSTCD(2)
806 058B 1512 A      BOC NZRO,FIRST
807 058C 4F10 A      LI 3,CRANDR
808 058D 2104 A WLOOP: JMP .+5
809 058E 721E A      SKAZ 0,NC0(2)
810 058F 21F5 A      JMP INERR
811 0590 5CFE A      SHR 0,2
812 0591 14FB A      BOC BIT1,WLOOP ; BRANCH IF BUSY
813 0592 4700 A      PULL 3          ; MOVE DATA
814 0593 4300 A      PUSH 3
815 0594 8F00 A      LD 3,(3)
816 0595 8639 A      LD 1,ADBUF2(2)
817 0596 A546 A      ST 1,INDEX
818 0597 4D50 A      LI 1,80
819 0598 9144 A $11: LD 0,INDEX
820 0599 A300 A      ST 0,(3)
821 059A 7942 A      ISZ INDEX
822 059B 4B01 A      AISZ 3,1
823 059C 49FF A      AIS7 1,-1
824 059D 21FA A      JMP $11
825 059E              ;
826 059E 4F10 A FIRST: LI 3,CRANDR
827 059F 0401 A      RIN STATUS
828 05A0 2100 A BUSYT: JMP .+1
829 05A1 1405 A      BOC BIT1,READY ; BRANCH IF READY
830 05A2 8227 A OFFLN: LD 0,FSTCD(2)
831 05A3 1503 A      BOC NZRO,READY
832 05A4 4C01 A      LI 0,1
833 05A5 A227 A      ST 0,FSTCD(2)
834 05A6 0201 A      RTS 1
835 05A7              ;
836 05A7 8239 A READY: LD 0,ADBUF2(2)
837 05A8 3280 A RDC:  RXCH 0,2
838 05A9 2D05 A      JSR @RDCRDP
839 05AA 21DA A      JMP INERR
840 05AB 3281 A      RCPY 0,2
841 05AC 8227 A      LD 0,FSTCD(2)
842 05AD 15DA A      BOC NZRO,FIRS2 ; BRANCH IF FIRST CARD
843 05AE 0201 A      RTS 1
844 05AF              ;
845 05AF 7FD3 A RDCRDP: .WORD 07FD3

846 05B0              .PAGE 'INITIALIZATION OF 16L/16P'
847 05B0              ;
848 05B0              ; INITIALIZE PROGRAM FOR 16L/16P
849 05B0              ;
850 05B0 2E48 A LIMIT: JSR @SETLP(2)
851 05B1 810C A      LD 0,WLPA
852 05B2 A1DA A      ST 0,WLOOP

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PROMP

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853 05B3 810B A      LD      0,LBUSYT
854 05B4 A1E8 A      ST      0,BUSYT
855 05B5 810A A      LD      0,LRDC
856 05B6 A1F1 A      ST      0,RDC
857 05B7 8109 A      LD      0,LRDC+1
858 05B8 A1F0 A      ST      0,RDC+1
859 05B9 8108 A      LD      0,LRDC+2
860 05BA A1EF A      ST      0,RDC+2
861 05BB 8107 A      LD      0,LRDC+3
862 05BC A1EE A      ST      0,RDC+3
863 05BD 0200 A      RTS
864 05BE          ;
865 05BE 0401 A WTLPA: RIN      STATUS
866 05BF 5CFF A LBUSYT: SHR     0,1
867 05C0 0602 A LRDC:  ROUT     STNDRD
868 05C1 1C01 A      BOC      POA, .+2
869 05C2 21FD A      JMP      .-2
870 05C3 2100 A      JMP      .+1

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871 05C4          .PAGE      'HOLLERITH TO ASCII CONVERSION'
872 05C4          ;
873 05C4 .918 A C-TOA: ST      2,INDEX          ; SAVE PBPAGE INDEX
874 05C5 4700 .      PULL     3
875 05C6 4300 .      PUSH     3
876 05C7 4D50 A      LI      1,80
877 05A8 8F00 A      LD      3,(3)
878 05C9 8300 A $5:   LD      0,(3)
879 05CA 890F A      LD      2,? ADDR
880 05CB F200 . /$7:  SKNE     0,(2)
881 05 C 2105 A      JMP      $14+1
882 05CD F90D A      SKNE     2,BADDR
883 05CE 2102 A      JMP      $14
884 05CF 4A01 A      AISZ     2,1
885 05D0 21FA A      JMP      $7
886 05D1 8908 A $14:  LD      2,TADDR
887 05D2 D907 A      SUB      2,TADDR
888 05D3 4A20 A      AISZ     2,X'20
889 05D4 .R00 A      ST      2,(3)
890 05D5 4B01 A      AISZ     3,1
891 05D6 49FF A      AISZ     1,-1
892 05D7 21F1 A      JMP      $5
893 05D8 8904 A      LD      2,INDEX          ; RESTORE PBPAGE INDEX
894 05D9 0201 A      RTS      1
895 05DA          ;
896 05DA 0617 T TADDR: .WORD     BEGHOL          ; TOP OF HOLLERITH TABLE
897 05DB 0657 T BADDR: .WORD     ENDHOL
898 05DC 05DD T COUNT: .,+.1
899 05DD 05DE T INDEX: .,+.1
900 05DF          ;
901 05DE 0800 A C12   =      2048
902 05DE 0400 A C11   =      1024
903 05DE 0200 A C0    =      512
904 05DE 0100 A C1    =      256
905 05DE 0080 A C2    =      128
906 05DE 0040 A C3    =      64
907 05DE 0020 A C4    =      32
908 05DE 0010 A C5    =      16
909 05DE 0008 A C6    =      8
910 05DE 0004 A C7    =      4
911 05DE 0002 A C8    =      2
912 05DE 0001 A C9    =      1

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PROMP

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913 05DE          .PAGE  'ASCII TO BINARY CONVERSION'
914 05DE          ;
915 05DE A9FE A AHEB: ST 2,INDEX          ; SAVE PBPAGE INDEX
916 05DF 4D04 A     LI 1,4
917 05E0 A5FB A     ST 1,COUNT
918 05E1 5C04 A $3: SHL 0,4
919 05E2 8700 A     LD 1,(3)
920 05E3 890E A     LD 2,TABAD
921 05E4 F600 A $6: SKNE 1,(2)
922 05E5 2105 A     JMP $10+1          ; FOUND HEX NUMBER
923 05E6 F90C A     SKNE 2,TABTOP
924 05E7 2102 A     JMP $10
925 05E8 4A01 A     AIS7 2,1
926 05E9 21FA A     JMP $6
927 05EA 8907 A $10: LD 2,TABAD
928 05EB D906 A     SUB 2,TABAD
929 05EC 3800 A     RADD 2,0
930 05ED 4B01 A     AIS7 3,1
931 05EE 7DE0 A     DSZ COUNT
932 05EF 21F1 A     JMP $3
933 05F0 89EC A     LD 2,INDEX          ; RESTORE PBPAGE NUMBER
934 05F1 0200 A     RTS
935 05F2          ;
936 05F2 065B T TABAD: .WORD BEGASC
937 05F3 065A T TABTOP: .WORD ENDASC

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938 05F4          .PAGE  'SPECIAL OUTPUT ROUTINES'
939 05F4          ;
940 05F4 818A A CRLF: LD 0,XCRLF
941 05F5 2900 A     JSR PUT2C
942 05F6 0200 A     RTS
943 05F7          ;
944 05F7 4700 A TYPE: PULL 3
945 05F8 4300 A     PUSH 3
946 05F9 8F00 A     LD 3,(3)
947 05FA 8300 A     LD 0,(3)
948 05FB 1111 A     BOC ZRO,RET1
949 05FC 2902 A     JSR PUT2C
950 05FD 4B01 A     AISZ 3,1
951 05FE 21FB A     JMP .-4
952 05FF          ;
953 05FF 2900 A PUT2A: JSR .+1
954 0600 5808 A     ROL 0,8
955 0601 2E4A A     JSP @PUTC(2)
956 0602 0200 A     RTS

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957 0603          .PAGE  'GET CHARACTER ROUTINE'
958 0603          ;
959 0603 2E4C A GETCO: JSR @GETCO(2)
960 0604 621C A     AND 0,N7F(2)          ; MASK OUT BITS 7-15
961 0605 D214 A     SKNE 0,4(2)          ; TEST FOR CNTRL/D
962 0606 2107 A     JMP REINIT
963 0607 F218 .     SKNE 0,SP(2)          ; TEST FOR SPACE
964 0608 21FA A     JMP GETCO
965 0609 F219 A     SKNE 0,COM(2)          ; TEST FOR COMMA
966 060A 21F8 .     JMP GETCO
967 060B F21G A     SKNE 0,ALT(2)          ; TEST FOR ALT KEY
968 060C 0200 A     RTS
969 060D 0201 A RET1: RTS 1
970 060E          ;

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PROMP

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971 060C 4400 A REINIT: PULL 0 = RESTART
972 060F 263E A JMP @ASTART(2)

973 0610 .PAGE 'IF EQUAL JUMP ROUTINE'
974 0610 =
975 0610 ; JSR @SIFEQ(2)
976 0610 ; .WORD A
977 0610 = .WORD B
978 0610 ; .WORD C
979 0610 ; D: ***
980 0610 ;
981 0610 ; IF A=B, JUMP TO C, ELSE JMP TO D
982 0610 ;
983 0610 4700 A IFEQ: PULL 3
984 0611 9300 A LD 0,0(3)
985 0612 9701 A LD 1,@1(3)
986 0613 3482 A RXOR 1,0
987 0614 1101 A BOC ZRO,+.2
988 0615 2303 A JMP 3(3)
989 0616 2702 A JMP @2(3)

990 0617 .PAGE 'HOLLERITH TABLE'
991 0617 ;
992 0617 0000 A BEGHOL: .WORD 0
993 0618 0482 A .WORD C11+C2+C8, C7+C8, C3+C8, C11+C3+C8
994 0619 0006 A
995 061A 0042 A
996 061B 0442 A
997 061C 0222 A .WORD C0+C4+C8, C12, C5+C8, C12+C5+C8
998 061D 0800 A
999 061E 0012 A
1000 061F 0812 A
1001 0620 0412 A .WORD C11+C5+C8, C11+C4+C8, C12+C6+C8
1002 0621 0422 A
1003 0622 080A A
1004 0623 0242 A .WORD C0+C3+C8, C11, C12+C3+C8, C0+C1, C0, C1, C2
1005 0624 0400 A
1006 0625 0842 A
1007 0626 0300 A
1008 0627 0200 A
1009 0628 0100 A
1010 0629 0080 A
1011 062A 0040 A .WORD C3, C4, C5, C6, C7, C8, C9, C2+C8, C11+C6+C8
1012 062B 0020 A
1013 062C 0010 A
1014 062D 0008 A
1015 062E 0004 A
1016 062F 0002 A
1017 0630 0001 A
1018 0631 0002 A
1019 0632 040A A
1020 0633 0822 A .WORD C12+C4+C8, C6+C8, C0+C6+C8, C0+C7+C8
1021 0634 000A A
1022 0635 020A A
1023 0636 0206 A
1024 0637 0022 A .WORD C4+C8, C12+C1, C12+C2, C12+C3, C12+C4
1025 0638 0900 A
1026 0639 0880 A
1027 063A 0840 A
1028 063B 0820 A
1029 063C 0810 A .WORD C12+C5, C12+C6, C12+C7, C12+C8, C12+C9

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063D 0808 A
063E 0804 A
063F 0802 A
0640 0801 A
1001 0641 0500 A .WORD C11+C1,C11+C2,C11+C3,C11+C4,C11+C5
0642 0480 A
0643 0440 A
0644 0420 A
0645 0410 A
1002 0646 0408 A .WORD C11+C6,C11+C7,C11+C8,C11+C9,C0+C2
0647 0404 A
0648 0402 A
0649 0401 A
064A 0200 A
1003 064B 0240 A .WORD C0+C3,C0+C4,C0+C5,C0+C6,C0+C7,C0+C8
064C 0220 A
064D 0210 A
064E 0208 A
064F 0204 A
0650 0202 A
1004 0651 0201 A .WORD C0+C9,C12+C2+C8,C0+C8+C2,C12+C7+C8
0652 0882 A
0653 0282 A
0654 0806 A
1005 0655 0406 A .WORD C11+C7+C8,C0+C5+C8
0656 0212 A
1006 0657 0102 A ENDHOL: .WORD C8+C1

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1007 0658 .PAGE 'PSEUDO BASE PAGE'
1008 0658 ;
1009 0658 PBPAGE:
1010 0658 ;
1011 0658 0000 A SNULLS = .-PBPAGE
1012 0658 042B T .WORD $160N
1013 0659 0001 A SCR4 = .-PBPAGE
1014 0659 03D0 T .WORD CR4
1015 065A 0002 A SOUTPN = .-PBPAGE
1016 065A 0435 T .WORD OUTPN
1017 065B 0030 A BEGASC: .WORD X'30
1018 065C 0004 A ONE = .-PBPAGE
1019 065C 0031 A .WORD X'31
1020 065D 0005 A TWO = .-PBPAGE
1021 065D 0032 A .WORD X'32
1022 065E 0006 A THREE = .-PBPAGE
1023 065E 0033 A .WORD X'33
1024 065F 0007 A FOUR = .-PBPAGE
1025 065F 0034 A .WORD X'34
1026 0660 0035 A .WORD X'35
1027 0661 0036 A .WORD X'36
1028 0662 0037 A ASC7: .WORD X'37
1029 0663 0038 A ASC8: .WORD X'38
1030 0664 0039 A .WORD X'39
1031 0665 0041 A .WORD X'41
1032 0666 0042 A .WORD X'42
1033 0667 0043 A ASCC: .WORD X'43
1034 0668 0044 A .WORD X'44
1035 0669 0045 A .WORD X'45
1036 066A 0046 A ENDASC: .WORD X'46
1037 066B 0013 A N2 = .-PBPAGE
1038 066B 0002 A .WORD X'02
1039 066C 0014 A N4 = .-PBPAGE
1040 066C 0004 A .WORD X'04

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1041 066D 0015 A N8      =      .-PBPAGE
1042 066D 0008 A          .WORD    X'08
1043 066E 001F A CCR      =      .-PBPAGE
1044 066E 000D A          .WORD    X'0D
1045 066F 0017 A NF       =      .-PBPAGE
1046 066F 000F A          .WORD    X'0F
1047 0670 0018 . SP       =      .-PBPAGE
1048 0670 0020 A          .WORD    X'20
1049 0671 0019 . COM      =      .-PBPAGE
1050 0671 002C A          .WORD    X'2C
1051 0672 001A A COL      =      .-PBPAGE
1052 0672 003A A          .WORD    X'3A
1053 0673 001B A ALT      =      .-PBPAGE
1054 0673 007E A          .WORD    X'7D
1055 0674 001C A N7F      =      .-PBPAGE
1056 0674 007F A          .WORD    X'7F
1057 0675 001D A N80      =      .-PBPAGE
1058 0675 0080 . /        .WORD    X'80
1059 0676 001C A NCO      =      .-PBPAGE
1060 0676 00C0 A          .WORD    X'C0
1061 0677 001F A NFF      =      .-PBPAGE
1062 0677 00FF A          .WORD    X'FF
1063 0678 0020 . N256     =      .-PBPAGE
1064 0678 0100 A          .WORD    256
1065 0679 0021 A N1FF     =      .-PBPAGE
1066 0679 01FF A          .WORD    X'1FF
1067 067A 0022 A N512     =      .-PBPAGE
1068 067A 0200 A          .WORD    512
1069 067B 0023 A NE00     =      .-PBPAGE
1070 067B 0E00 A          .WORD    X'E00
1071 067C 0024 A NFFF      =      .-PBPAGE
1072 067C 0FFF A          .WORD    X'FFF
1073 067D 0025 A N8004    =      .-PBPAGE
1074 067D 8004 A          .WORD    X'8004
1075 067E 0026 A NC        =      .-PBPAGE
1076 067E 000C A          .WORD    X'0C
1077 067F 0027 A FSTCD     =      .-PBPAGE
1078 067F FFFF A          .WORD    -1
1079 0680 0028 . CR       =      .-PBPAGE
1080 0680 4352 A          .ASCII    'CR'
1081 0681 0029 . PT       =      .-PBPAGE
1082 0681 5054 .          .ASCII    'PT'
1083 0682 002 . A MF       =      .-PBPAGE
1084 0682 4D45 A          .ASCII    'ME'
1085 0683 002B A OM        =      .-PBPAGE
1086 0683 4F4D A          .ASCII    'OM'
1087 0684 002A A PN        =      .-PBPAGE
1088 0684 504C A          .ASCII    'PN'
1089 0685 002E A BC        =      .-PBPAGE
1090 0685 4243 A          .ASCII    'BC'
1091 0686 002E A BIN9      =      .-PBPAGE
1092 0686 0009 A          .WORD     9
1093 0687 002F A ASCL      =      .-PBPAGE
1094 0687 004C A          .WORD     04C
1095 0688 0030 A ASCR      =      .-PBPAGE
1096 0688 0052 A          .WORD     052
1097 0689 0031 A LL        =      .-PBPAGE
1098 0689 4C4C A          .ASCII    'LL'
1099 068A 0032 A LR        =      .-PBPAGE
1100 068A 4C52 A          .ASCII    'LR'
1101 068A 0033 A HL        =      .-PBPAGE
1102 068B 484C A          .ASCII    'HL'
1103 068C 0034 A HR        =      .-PBPAGE

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1104 068C 4852 A      .ASCII 'HR'
1105 068D 0035 A SMOFF =      .-PBPAGE
1106 068D 068E T      .=.+1
1107 068E 0036 A LTS'1 =      .-PBPAGE
1108 068E 068F T      .=.+1
1109 068F 0037 A CKSM =      .-PBPAGE
1110 068F 0690 T      .=.+1
1111 0690 0038 A ADBUF1 =      .-PBPAGE
1112 0690 0692 T      .WORD BUF1
1113 0691 0039 A ADBUF2 =      .-PBPAGE
1114 0691 0902 T      .WORD BUF2
1115 0692 003A A ADLMT =      .-PBPAGE
1116 0692 06AC T      .WORD SLMT
1117 0693 003B A ADLO =      .-PBPAGE
1118 0693 06B1 T      .WORD LO
1119 0694 003C A ADHI =      .-PBPAGE
1120 0694 07B2 T      .WORD HI

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1121 0695          .PAGE 'SUBROUTINE VECTOR'
1122 0695          ;
1123 0695 003D A SPAPOM =      .-PBPAGE
1124 0695 04A9 T      .WORD PAPRLM
1125 0696 003E A ASTART =      .-PBPAGE
1126 0696 025B T      .WORD START
1127 0697 003F A SCRLF =      .-PBPAGE
1128 0697 05F4 T      .WORD CRLF
1129 0698 0040 A SGETCO =      .-PBPAGE
1130 0698 0603 T      .WORD GETCO
1131 0699 0041 A SAHEB =      .-PBPAGE
1132 0699 05DE T      .WORD AHEB
1133 069A 0042 A SRDCRD =      .-PBPAGE
1134 069A 058A T      .WORD RDCARD
1135 069B 0043 A SCHTOA =      .-PBPAGE
1136 069B 05C4 T      .WORD CHTOA
1137 069C 0044 A SIFEQ =      .-PBPAGE
1138 069C 0610 T      .WORD IFEQ
1139 069D 0045 A STYPE =      .-PBPAGE
1140 069D 05F7 T      .WORD TYPE
1141 069E 0046 A SPUT2C =      .-PBPAGE
1142 069E 05FF T      .WORD PUT2C
1143 069F 0047 A LINITA =      .-PBPAGE
1144 069F 0580 ?      .WORD LINIT
1145 06A0 0048 A SETLP =      .-PBPAGE
1146 06A0 09BC T      .WORD SETPL
1147 06A1 0049 A INTEST =      .-NBPAGE
1148 06A1 0996 T      .WORD TTEST
1149 06A2 004A A PUTC =      .-PBPAGE
1150 06A2 0967 T      .WORD PPUTC
1151 06A3 004B A GETC =      .-NBPAGE
1152 06A3 096B T      .WORD SGETC
1153 06A4 004C A GECC =      .-PBPAGE
1154 06A4 0992 T      .WORD PGECO
1155 06A5 004D A SROL8 #      .-PBPAGE
1156 06A5 0423 T      .WORD ROL8

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1157 06A6          .PAGE 'TEMPORARY BUFFERS'
1158 06A6          ;
1159 06A6 004E A ADDR =      .-PBPAGE
1160 06A6 06A7 T      .=.+1
1161 06A7 004F A LENGTH =      .-PBPAGE
1162 06A7 06A8 T      .=.+1

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PROMP

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1163 06A8 0050 A MODE      =      .-PBPAGE
1164 06A8 06A9 T           .=. +1
1165 06A9 0051 A OPTION    =      .-PBPAGE
1166 06A9 06AA T           .=. +1
1167 06AA 0052 A SLO       =      .-PBPAGE
1168 06AA 06AB T           .=. +1
1169 06AB 0053 A SHI       =      .-PBPAGE
1170 06AB 06AC T           .=. +1
1171 06AC 0054 A LMT       =      .-PBPAGE
1172 06AC 06B0 T SLMT:     .=. +4

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1173 06B0                .PAGE   'BUFFER'
1174 06B0                ;
1175 06B0 0058 A LOH       =      .-PBPAGE
1176 06B0 06B1 T           .=. +1
1177 06B1 07B1 T LO:      .=. +256
1178 07B1 07B2 T HIGH:    .=. +1
1179 07B2 08B2 T HI:      .=. +256
1180 08B2 0902 T BUF1:    .=. +80
1181 0902 0952 T BUF2:    .=. +80
1182 0952                ;
1183 0952                ;
1184 0952 0029 A TA        =      41
1185 0952 0012 A TB        =      18
1186 0952 0070 A TC        =     112
1187 0952 0009 A EA        =       9
1188 0952 0016 A EB        =      22
1189 0952 0026 A EC        =      38
1190 0952 0038 A TTYAD     =      7*8
1191 0952 FFF5 A DELAY     =     0FFF5
1192 0952 FFF6 A DELAY1    =     0FFF6
1193 0952 FFFB A TTYSR     =     0FFFB

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1194 0952                .PAGE
1195 0952                ;   TELETYPE TRANSMIT CHARACTER ROUTINE
1196 0952                ;
1197 0952 294B A LPUTC:     JSR      SAVE
1198 0953 3181 A           RCPY     0,1
1199 0954 0A80 A           PFLG     2
1200 0955 4C30 A           LI       0,X'30
1201 0956 03B6 A           JSRI     DELAY1
1202 0957 4e09 A           LI       2,0
1203 0958 4F38 A           LI       3,TTYAD
1204 0959 0603 A           ROUT     3
1205 095A 03F5 A LPC1:     JSRI     DELAY
1206 095B 5829 A           ROL       0,TA
1207 095C 4AFF A           AISZ     2,-1
1208 095D 2101 A           JMP       .+2
1209 095E 2104 A           JMP       DONE
1210 095F 59FF A           ROR       1,1
1211 0960 3481 A           RCPY     1,0
1212 0961 0603 A           ROUT     3
1213 0962 21F7 A           JMP       LPC1
1214 0963 4CFF A DONE:     LI       0,-1
1215 0964 0603 A           ROUT     3
1216 0965 0605 .           ROUT     5
1217 0966 2140 A           JMP       RESTOR

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1218 0967                .PAGE
1219 0967                ;

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1220 0067 2936 A PPUTC: JSR    SAVE
1221 0068 2D01 A      JSR0   PPUTCA
1222 0069 2146 A      JMP     RESTOR
1223 006A      ;
1224 006A 7E59 A PPUTCA: .WORD  07E59

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1225 006B      .PAGE
1226 006C      ;      GET CHARACTER ROUTINE
1227 006B      ;
1228 006B 2932 A SGETC: JSR     SAVE
1229 006C 2D02 A PGETC: JSR     @PGETCA
1230 006D A13C A      ST      0,REG
1231 006E 2141 A      JMP     RESTOR
1232 006F      ;
1233 006F 7E3B A PGETCA: .WORD  07E3B

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1234 0070      .PAGE
1235 0070      ;      GET CHARACTER AND ECHO ROUTINE
1236 0070      ;
1237 0070 292D A LGECO: JSR     SAVE
1238 0071 4F38 A      LI      3,TTYAD
1239 0072 0A00 A      PFLG    2
1240 0073 0605 A      ROUT     5
1241 0074 4E08 A      LI      2,8
1242 0075 0604 A      ROUT     4
1243 0076 0402 A      RIN      2
1244 0077 1201 A      BOC      2,+.2
1245 0078 21FD A      JMP      .-2
1246 0079 4C09 A      LI      0,EA
1247 007A 03F6 A      JSRI     DELAY1
1248 007B 58CA A      ROR      0,EB
1249 007C 0402 A      RIN      2
1250 007D 1201 A      BOC      2,+.2
1251 007E 21F4 A      JMP      LGECO+3
1252 007F 0603 A LP3:  ROUT     3
1253 0080 03F5 A      JSRI     DELAY
1254 0081 5825 A      ROL      0,EC
1255 0082 0402 A      RIN      2
1256 0083 610D A      AND      0,MASK
1257 0084 5DFF A      SHR      1,1
1258 0085 3182 A      RXOR     0,1
1259 0086 4AFF A      AISZ     2,-1
1260 0087 21F7 A      JMP      LP3
1261 0088 0603 A      ROUT     3
1262 0089 03F5 A      JSRI     DELAY
1263 008A 4CFF A      LI      0,-1
1264 008B 0603 A      ROUT     3
1265 008C 03F5 A      JSRI     DELAY
1266 008D 0605 A      ROUT     5
1267 008E 5DF8 A      SHR      1,8
1268 008F 3481 A      RCPY     1,0
1269 0090 21DC A      JMP      PGETC+1
1270 0091      ;
1271 0091 8000 A MASK:  .WORD  X'8000

```

```

1272 0092      .PAGE
1273 0092      ;
1274 0092 290B A PGECO: JSR     SAVE
1275 0093 2D01 A      JSR0   PGECO0
1276 0094 21D3 A      JMP     PGETC+1

```

PROMP

```
1277 0995      ;
1278 0995 7E73 A PGEOA: .WORD 07E73
```

```
1279 0996      .PAGE
1280 0996      ; TELETYPE INPUT TEST
1281 0996      ;
1282 0996      ; RTS 1 - NORMAL RETURN
1283 0996      ; RTS 0 - ATTEMPT TO INPUT
1284 0996      ;
1285 0996 2907 A TTEST: JSR    SAVE
1286 0997 4F00 A      LI      3,0
1287 0998 0406 A      RIN      6
1288 0999 5C08 A      SHL      0,8
1289 099A 1201 A      BOC      2,.,+2
1290 099B 2114 A      JMP      RESTOR
1291 099C 2913 A      JSR      RESTOR
1292 099D 0201 A      RTS      1
```

```
1293 099E      .PAGE
1294 099E      ; SAVE/RESTORE REGISTERS AND FLAGS ROUTINE
1295 099E      ;
1296 099E A10B A SAVE: ST      0,REG
1297 099F A50B A      ST      1,REG+1
1298 09A0 A90B A      ST      2,REG+2
1299 09A1 AD0B A      ST      3,REG+3
1300 09A2 0080 A      PUSHF
1301 09A3 4400 A      PULL     0
1302 09A4 A10A A      ST      0,FLAGS
1303 09A5 4C01 A      LI      0,1
1304 09A6 58FE A      ROR      0,2
1305 09A7 A106 A      ST      0,SELECT
1306 09A8 8101 A      LD      0,REG
1307 09A9 0200 A      RTS
1308 09AA      ;
1309 09AA 09AE T REG:  .=.,+4
1310 09AE 09AF T SELECT: .=.,+1
1311 09AF 09B0 T FLAGS: .=.,+1
1312 09B0      ;
1313 09B0 85FA A RESTOR: LD      1,REG+1
1314 09B1 89FA A      LD      2,REG+2
1315 09B2 8DFA A      LD      3,REG+3
1316 09B3 81FB A      LD      0,FLAGS
1317 09B4 4000 A      PUSH     0
1318 09B5 0280 A      PULLF
1319 09B6 0A00 A      SFLG     2
1320 09B7 81F6 A      LD      0,SELECT
1321 09B8 1801 A      BOC      NEG,.,+2
1322 09B9 0A80 A      PFLG     2
1323 09BA 81EF A      LD      0,REG
1324 09BB 0200 A      RTS
```

```
1325 09BC      .PAGE
1326 09BC      ;
1327 09BC      ; TELETYPE SYSTEM INITIALIZATION/RESET
1328 09BC      ;
1329 09BC      ;
1330 09BC 29E1 . SETPL: JSR      SAVE
1331 09BD 8D10 A      LD      3,SCPAD
1332 09BE 0418 A      RIN      GPCS
1333 09BF 4801 A      AISZ     0,1
```

PROMP

```

1334 09C0 2103 A      JMP      SLINIT
1335 09C1 4F38 A RST:  LI      3,TTYAD
1336 09C2 0605 A      RQUT    5
1337 09C3 21EC A      JMP      RESTOR
1338 09C4      ;
1339 09C4      ;
1340 09C4 8106 A SLINIT: LD      0,LPUTCA
1341 09C5 A24A A      ST      0,PUTC(2)
1342 09C6 8105 A      LD      0,LGETCA
1343 09C7 A1A4 A      ST      0,PGETC
1344 09A8 8104 A      LD      0,LGECO A
1345 09C9 A24C A      ST      0,GECO(2)
1346 09CA 21F6 A      JMP      RST
1347 09CB      ;
1348 09CB 0952 T LPUTCA: .WORD   LPUTC
1349 09CC 03FB A LGETCA: JSRI   TTYSR
1350 09CD 0970 T LGECO A: .WORD   LGECO
1351 09CE 0760 A SCPAD:  .WORD   0760
1352 09CF 0250 T      .END    START1

```

>***** 0 ERRORS IN ASSEMBLY *****

```

$1      $10      $11      $12      $13      $14      $2      $3      $5      $6
0279 T 05EA T 0598 T 03DC T 0475 T 05D1 T 027B T 05E1 T 05C9 T 05E4 T

$7      ADBASE ADBUF1 ADBUF2 ADDR  ADHI  ANUMT  ADLO  AHEB  ALT
05CB T 0289 T 0038 A 0039 A 004E A 003C A 003A A 003B A 05DE T 001B A

ASC7    ASC8    ASCC    ASCL    ASCR    ASTART BADDR  BC      BCTP    BEGASC
0662 T 0663 T 0667 T 002F A 0030 A 003E A 05DB T 002D A 03D2 T 065G T

BEGHOL BIN9     PINASC BIT1    BUF1    BUF2    BUSYT  BYTOPT C0      C09
0617 T 002E A 0413 T 0004 A 08B2 A 0902 T 05A0 T 033B T 0200 A 0421 T

C1      C11      C12      C2      C3      C4      C5      C6      C7      C8
0100 A 0400 A 0800 A 0000 A 0040 A 0020 A 0010 A 0008 A 0004 A 0002 A

C9      CRACK  CCR      CHTOA  CKMTBL CKSM    CN1      CN2      CN3      CN6
0001 A 03F5 T 0016 A 05A4 T 040A T 0037 A 0442 T 044F T 045F T 048B T

CN6A    CM7      COL      CM1      COUNT  CPAD     CR      CR1      CR2      CR3
0490 T 0483 T 001A A 0019 A 05DC T 028A T 0028 A 03A8 T 03B3 T 03C4 T

CR4      CR6      CR6A    CR7      CRADDR CRIN    CRLF    DELAY  DELAY1 DONE
03D0 T 03EA T 03FB T 03HF T 0010 A 028D T 05F4 T FFF5 A FFF6 A 0963 T

EA      EB      EC      ENDASC ENDHOL FIRS2  FIRST  FLAGS  FOUR   FSTCD
0000 A 0016 A 0026 066A T 0657 T 0588 T 059E T 09AF T 0007 A 0027 A

GECO    GETC     GETCO    GPCS    H0707 H7070 H1      HIGH   HL      HMES
004C A 004B A 0603 T 0018 A 0365 T 0366 T 07B2 T 07B1 T 0033 A 0367 T

HR      IFF0     INDEV    INERR   INTST  LBUSYT LDNATA LENGTH LGECO  LGECO A
0034 A 0610 T 05HD T 0585 T 0049 A 05BF T 029C T 004F A 0970 T 09CD T

LGETCA LIMIT  LIMITA LL      LMES    LMT     LO      LOOP1  LOOP2  LOW
09CC T 05B0 T 0047 A 0031 A 036E T 0054 A 06E1 T 0382 T 0384 T 0058 A

```

PROMP

P1	LP2	LP3	LP4	LP5	LP6	LPC1	LPUTC	LPUTCA	LR
02CF T	02EC T	097F T	02F6 T	032F T	033D T	095A T	0952 T	09CB T	0032 A
LRDC	LTSW	M25G	M512	MASK	ME	MEM	MODE	N1FF	N2
05C0 T	0036 A	0344 T	0352 T	0991 T	002A A	02E9 T	0050 A	0021 A	0013 A
N256	N4	N512	N7F	N8	N80	N8004	NC	NC0	NE00
0020 A	0014 A	0022 A	001C A	0015 A	001D A	0025 A	0026 A	001E A	0023 A
NEG	NF	NFF	NFFF	NZRO	ODD	OFFLN	OM	ONE	OPTION
000B A	0017 A	001F A	0024 A	0005 A	0003 A	05A2 T	002B A	0004 A	0051 A
OUTPN	OUTPR	PAPRLM	PBPAGE	PGECO	PGEOA	PGETC	PGETCA	PN	PNTP
0435 T	039B T	04A9 T	0658 T	0992 T	0995 T	096C T	096F T	002C A	046B T
POA	PPUTC	PPUTCA	PT	PTIN	PUT2C	PUTC	PUTSEL	RDC	RDCARD
000C A	0967 T	096A T	0029 A	02B0 T	05FF T	004A A	037C T	05A8 T	058A T
RDCRDP	READY	REG	REINIT	RESTOR	RET1	RL	RMES	ROL8	RST
05AF T	05A7 T	09AA T	060E T	09B0 T	060D T	0415 T	0375 T	0423 T	09C1 T
S160N	S40N	SAHEB	SAVE	SCHTOA	SCPAD	SCR4	SCRLF	SELECT	SETCR
042B T	042D T	0041 A	099E T	0043 A	09CE T	0001 A	003F A	09AE T	028B T
SETH	SETHL	SETHR	SETL	SETLL	SETLP	SETLR	SETOFF	SETPL	SETPT
0363 T	035B T	035D T	0361 T	0357 T	0048 A	0359 T	02E6 T	09BC T	02AE T
SGETC	SGETCO	SHI	SIFEQ	SLINIT	SLMT	SLO	SMODE	SNULLS	SOUTPN
096B T	0040 A	0053 A	0044 A	09C4 T	06AC T	0052 A	0035 A	0000 A	0002 A
SP	SPAPOM	SPUT2C	SRDCRD	SROL8	SS160N	START	START1	STATUS	STDATA
0018 A	003D A	0046 A	0042 A	004D A	04B9 T	025B T	0250 T	0001 A	02B8 T
STNDRD	STOLMT	STOPT	STTBL	STYPE	TA	TABAD	TABTOP	TADDR	TB
0002 A	0309 T	0317 T	041B T	0045 A	0029 A	05F2 T	05F3 T	05DA T	0012 A
TC	TEST	THREE	TMODE	TPAK1	TPAK10	TPAK11	TPAK12	TPAK13	TPAK14
0070 A	0398 T	0006 A	0341 T	04DA T	055B T	0564 T	056C T	0573 T	0576 T
TPAK15	TPAK16	TPAK17	TPAK2	TPAK3	TPAK4	TPAK5	TPAK6	TPAK6A	TPAK7
0579 T	057C T	057F T	04F3 T	04FD T	0509 T	0511 T	0525 T	052A T	052F T
TPAK8	TPAK9	TSTOPT	TTEST	TTYAD	TTYSR	TWO	TYPE	WAIT	WTLOOP
0539 T	054E T	0266 T	0996 T	0038 A	FFFB A	0005 A	05F7 T	0397 T	058D T
WTLPA	XCRLF	ZRO	ZROLMT						
05BE T	057F T	0001 A	0311 T						

38EC 7235

DEBUG

DEBUG

REVISION-G 05/16/74
 DEBUG 00112C 06/25/74

```

1 0000 FFFF A IMP16 = -1
2 0000 .TITLE DEBUG,'00112C 06/25/74'
3 0000 ; SOFTWARE DEBUG FOR IMP-16L/16P
4 0000 .ENDIF
5 0000 ;
6 0000 ; THIS PROGRAM HAS TWO ENTRY POINTS, 'DEBUG' AND 'DEBUG1'
7 0000 ;
8 0000 ; 'DEBUG' IS THE USUAL ENTRY POINT
9 0000 ;
10 0000 ; 'DEBUG1' GOES THROUGH THE PROCESS OF LOADING AN 'INITIALIZATION
11 0000 ; ROUTINE' TO LOCATIONS 0 AND 3. THIS INITIALIZATION ROUTINE GIVES
12 0000 ; THE CAPABILITY TO THE DEBUG USER TO RECOVER TO DEBUG BY DEPRESSING
13 0000 ; THE INITIALIZE BUTTON, THEN RUN.
14 0000 ;
15 0000 ; THIS PROGRAM MAY BE ASSEMBLED FOR EITHER THE GPC/P OR THE IMP-16L/16P
16 0000 ; TELETYPE. THE ASSEMBLER IS DIRECTED BY THE FOLLOWING CONSTANT:
17 0000 ;
18 0000 ; IMP16: 1 FOR GPC/P, -1 FOR IMP-16L/16P
19 0000 ;
20 0000 ; THIS PROGRAM MAY BE ASSEMBLED RELOCATABLE WITH FIXED OFFSETS
21 0000 ; DETERMINED BY THE FOLLOWING CONSTANT:
22 0000 ;
23 0000 ; OFFSET: 1 WITH FIXED OFFSETS, -1 WITHOUT OFFSETS
24 0000 ;
25 0000 ; WHEN ASSEMBLED WITH OFFSETS, 'BOFFSET' IS THE BASE .SECTOR OFFSET
26 0000 ; AND 'TOFFSET' IS THE TOP SECTOR OFFSET
27 0000 ;
28 0000 0001 A OFFSET = 1
29 0000 0010 A BOFFSET = 010
30 0000 0210 A TOFFSET = 0210
31 0000 000B A NEG = 0B
32 0000 ;
33 0000 .IF -IMP16
34 0000 ; IMP-16L TELETYPE DELAY CONSTANTS
35 0000 ; THE FOLLOWING CONSTANTS ARE FOR FULLSPEED OPERATION
36 0000 ;
37 0000 0029 A TA = 41
38 0000 0012 A TB = 18
39 0000 0070 A TC = 112
40 0000 0009 A EA = 9
41 0000 0016 A EB = 22
42 0000 0026 A EC = 38
43 0000 .ENDIF

44 0000 .SPACE 3
45 0000 .GLOBL DEBUG
46 0000 .GLOBL UCALL
47 0000 .GLOBL DEBUG1

48 0000 .PAGE
49 0000 .BSECT
50 0000 .IF OFFSET
51 0000 0010 B .=.+BOFFSET
52 0010 .ENDIF

```

DEBUG

```

53 0010          .SPACE 3
54 0010 0306 T ADSTRUN: .WORD SRUN ;SNAP RUNTIME ADDRESS
55 0011 02F1 T ADHRUN: .WORD HRUN ;HALT RUNTIME ADDRESS
56 0012 0328 T ASRUNB: .WORD SRUNB
57 0013 0325 T AHRUNB: .WORD HRUNB ;SECONDARY RUNTIME ADDRESS
58 0014 060E T SAVRIA: .WORD SAVREG
59 0015 0632 T RSTRIA: .WORD RESTOR

60 0016          .PAGE
61 0016          .TSECT
62 0000
63 0000          .IF OFFSET
64 0000 0210 T      .=.+TOFFSET
65 0210          .ENDIF
66 0210 0008 A HSZ   =8 ; 8 HALT/LOOKS
67 0210 000A A HRSZ  =10 ; 10 RANGES SNAP
68 0210 000A A DRSZ  =10 ; 10 RANGES DUMP
69 0210 000D A CR    =X'D
70 0210 000A A LF     =X'A
71 0210 0052 A IR     =R'/256
72 0210 005F A BS     =X'5F ; BACK ARROW
73 0210 0023 A HMARK =X'23 ; POUND SIGN
74 0210 003F A QMARK =?''/256
75 0210 002D A PCHAR ='-'/256 ;PROMPT CHAR
76 0210 0010 A STKSZ  =16 ;STACK SIZE
77 0210 0010 A STSZ   =STKSZ
78 0210 0000 A R0     =0 ;REGISTER 0
79 0210 0001 A R1     =1 ;REGISTER 1
80 0210 0002 A R2     =2 ;REGISTER 2
81 0210 0003 A R3     =3 ;REGISTER 3
82 0210          .IF -IMPL6
83 0210 0018 A GPCS   = 018
84 0210          .ENDIF

85 0210          .PAGE
86 0210          DEBUG1:
87 0210 4000 A        PUSH R0 ; SET DUMMY DEBUG RETURN ON STACK
88 0211 2C14 B        JSR@ SAVRIA ; SAVE FLAGS AND REGISTERS
89 0212 8104 A        LD R0,JMPI
90 0213 A000 A        ST R0,0 ; STORE 'JMP @3' AT LOCATION 0
91 0214 8103 A        LD R0,DIA
92 0215 A003 A        ST R0,3
93 0216 213B A        JMP DEBUG2
94 0217          ;
95 0217 2403 A JMP:    JMP @3
96 0218 0250 T DIA:    .WORD DEBUG

97 0219          .PAGE
98 0219          ;
99 0219 03CF T HBASEA: .WORD HTAB
100 021A 03EF T HRBASA: .WORD HRTAB
101 021B 0403 T DRBASA: .WORD DRTAB

102 021C          .PAGE
103 021C          ; PSEUDO BASE PAGE
104 021C 021C T DBASE=.
105 021C          .IF -IMPL6
106 021C 0000 A LECOI  = .-DBASE
107 021C 0420 T        .WORD LECHOI
108 021D 0001 A LECOIA = .-DBASE
109 021D 0423 T        .WORD ECHOA
110 021E 0002 A LTYPI  = .-DBASE
111 021E 0494 T        .WORD LTYPEI

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DEBUG

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112 021F 0003 A LTYPA = .-DBASE
113 021F 0499 T .WORD TYPEA
114 0220 .ENDIF
115 0220 0004 A APTOP = .-DBASE
116 0220 05BA T .WORD PTOP
117 0221 0005 A LPUT2C = .-DBASE
118 0221 04B2 T .WORD PUT2C
119 0222 0006 A LPCRLF = .-DBASE
120 0222 04AC T .WORD PCRLF
121 0223 0007 A LPUTC = .-DBASE
122 0223 0496 T .WORD PUTC
123 0224 0008 A LGETC = .-DBASE
124 0224 0422 T .WORD GETC
125 0225 0009 A LRTEST = .-DBASE
126 0225 04DF T .WORD RTEST
127 0226 000A A LTCRLF = .-DBASE
128 0226 04D9 T .WORD TCRLF
129 0227 000B A LEXPR = .-DBASE
130 0227 0538 T .WORD EXPR
131 0228 000C A LINPUT = .-DBASE
132 0228 0417 T .WORD INPUT
133 0229 000D A LRCHAR = .-DBASE
134 0229 052A T .WORD RCHAR
135 022A 000E A LVALUE = .-DBASE
136 022A 04EF T .WORD VALUE
137 022B 000F A LADDR = .-DBASE
138 022B 0503 T .WORD ADDR
139 022C 0010 A LPRANGE= .-DBASE
140 022C 05AF T .WORD PRANGE
141 022D 0011 A LOUTPUT= .-DBASE
142 022D 05C0 T .WORD OUTPUT
143 022E 0012 A LRESTOR= .-DBASE
144 022E 0632 T .WORD RESTOR
145 022F 0013 A LALPHA = .-DBASE
146 022F 025F T .WORD OUT
147 0230 0014 A LPUTBLK= .-DBASE
148 0230 05F7 T .WORD PUTBLK
149 0231 0015 A LPUT4H = .-DBASE
150 0231 04BB T .WORD PUT4H
151 0232 0016 A LHOK = .-DBASE
152 0232 02C4 T .WORD HOK
153 0233 0017 A LRANGE = .-DBASE

154 0233 0505 T .WORD RANGE
155 0234 0018 A LTTERM = .-DBASE
156 0234 04E7 T .WORD TTERM
157 0235 0019 A LOUTW = .-DBASE
158 0235 04AF T .WORD OUTW
159 0236 001A A LPUTADR= .-DBASE
160 0236 05FA T .WORD PUTADR
161 0237 001B A LRD0 = .-DBASE
162 0237 04CF T .WORD RD0
163 0238 001C A LOUTCL = .-DBASE
164 0238 0336 T .WORD OUTCL
165 0239 001D A VCOM = .-DBASE
166 0239 002C A .WORD ', '/256
167 023A 001E A ESCEX = .-DBASE
168 023A 023B T .=.+1 ;ESC EXIT
169 023B 001F A EXPEX = .-DBASE
170 023B 023C T .=.+1 ;EXPR ERROR EXIT
171 023C 0020 A OVREX = .-DBASE
172 023C 023D T .=.+1 ;OVER TABLE SIZE EXIT
173 023D 0021 A RPTR = .-DBASE

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DEBUG

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174 023D 0000 A      .WORD      0
175 023E 0022 A CL   =.-DBASE
176 023E 0000 A      .WORD      0      ;CURRENT LOCATION
177 023F 0023 A RWORD =.-DBASE
178 023F 0240 T      =.+1      ;'R' RELOCATION
179 0240 0024 A LCHAR =.-DBASE
180 0240 0241 T      =.+1      ;LAST CHAR
181 0241 0025 A FMT   =.-DBASE
182 0241 0000 A      .WORD      0      ;FORMAT
183 0242 0026 A DELTA =.-DBASE
184 0242 0243 T      =.+1      ;INCREMENT/DECREMENT
185 0243      ;
186 0243      ; PARAMETERS FOR HALT/SNAP
187 0243      ;
188 0243 0027 A HENT   =.-DBASE
189 0243 0000 A      .WORD      0      ;HALT TABLE ENTRY
190 0244 0028 A HPTR   =.-DBASE
191 0244 03CF T      .WORD      HTAB    ;HALT TABLE POINTER TO NEXT AVAILABLE
192 0245 0029 A HBASE  =.-DBASE
193 0245 03CF T      .WORD      HTAB    ;HALT TABLE BASE LOCATION
194 0246 002A A HMAX   =.-DBASE
195 0246 03EB T      .WORD      HSZ-1*4+HTAB ;HALT TAB MAX ENTRY LOCATION
196 0247 002B A HRPTR  =.-DBASE
197 0247 03EF T      .WORD      HRTAB    ;HALT RANGE TAB CURRENT POINTERS
198 0248 002C A HRBASE =.-DBASE
199 0248 03EF T      .WORD      HRTAB    ;HALT RANGE TAB BASE LOCATION
200 0249 002D A HRMAX  =.-DBASE
201 0249 0401 T      .WORD      HRSZ-1*2+HRTAB ;HRTAB MAX ENTRY LOCATION
202 024A 002E A SCODE  =.-DBASE
203 024A 2C10 B      JSR      @ADSRUN    ;SNAP RUN CALL
204 024B 002F A SCODEB =.-DBASE
205 024B 2C12 B      JSR      @ASRUNB     ;CALL TO SNAPB

206 024C 0030 A HCODE  =.-DBASE
207 024C 2C11 B      JSR      @ADHRUN    ;CALL TO HALT
208 024D 0031 A HCODEB =.-DBASE
209 024D 2C13 B      JSR      @AHRUNB     ;CALL TO HALTB
210 024E 0032 A CODE   =.-DBASE
211 024E 024F T      =.+1
212 024F 0033 A CODEB  =.-DBASE
213 024F 0250 T      =.+1

214 0250      .PAGE
215 0250      .LOCAL
216 0250      ; NEED TO SAVE REGISTERS EVEN ON INITIALIZATION ENTRANCE
217 0250      DEBUG:
218 0250 4000 A      PUSH      R0      SET DUMMY DEBUG RETURN ON STACK
219 0251 2C14 B      JSR@      SAVRIA
220 0252 4F38 A      DEBUG2: LI      R3,TTYAD
221 0253 0605 A      ROUT      5
222 0254      .IF      -IMP16
223 0254 8D05 A      LD      R3,CPAD
224 0255 0418 A      RIN      GPCS
225 0256 8D1D A      LD      R3,$2
226 0257 4801 A      AISZ     R0,1
227 0258 2102 A      JMP      $INIT
228 0259 2105 A      JMP      OUT
229 025A 0760 A CPAD:  .WORD      0760
230 025B      ;
231 025B 9300 A $INIT: LD      R0,@LECOI(R3)
232 025C B301 A      ST      R0,@LECOA(R3)
233 025D 9302 A      LD      R0,@LTYPI(R3)
234 025E B303 A      ST      R0,@LTYPA(R3)

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DEBUG

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235 025F                .ENDIF
236 025F                ;
237 025F 2F06 A OUT:    JSR      @LPCRLF(R3)
238 0260 4C2D A        LI      R0,PCHAR      ;OUTPUT
239 0261 2F07 A        JSR      @LPUTC (R3)    ;PROMPT
240 0262                ;  INITIALIZE PARAMETERS
241 0262 4C00 A        LI      R0,0
242 0263 A323 A        ST      R0,RWORD(R3)    ;REG RELOCATION
243 0264 4C01 A        LI      R0,1
244 0265 A326 A        ST      R0,DELTA(R3)    ;INC/DECREMENT
245 0266 8129 A        LD      R0,AERADR
246 0267 A31F A        ST      R0,EXPEX(R3)    ;EXPR EXIT
247 0268 8132 A        LD      R0,ESCADR
248 0269 A31E A        ST      R0,ESCEX(R3)    ;ESCAPE EXIT
249 026A 8132 A        LD      R0,OVRAADR
250 026B A320 A        ST      R0,OVREX(R3)    ;EXIT
251 026C                ;  GET CHARACTER DRIVER
252 026C 2F0C A        JSR      @LINPUT(R3)    ;NON-BLANK
253 026D A121 A        ST      R0,CEND
254 026E                ;  WILL FIND CHAR LAST IF NO MATCH
255 026E 892D A        LD      R2,CTADR        ; CONTROL TABLE
256 026F F200 A $1:    SKNE     R0,(R2)
257 0270 2102 A        JMP      CFND            ;FOUND
258 0271 4A02 A        AISZ     R2,2
259 0272 21FC A        JMP      $1
260 0273                CFND:
261 0273 2601 A        JMP      @1(R2)          ;POINT TO
262 0274                ;ADDRESS
263 0274 021C T $2:    .WORD    DBASE          ;B TO CODE

264 0275                .PAGE
265 0275                .LOCAL
266 0275 0041 A CTAB:  .WORD    'A'/256
267 0276 034B T        .WORD    ALTER
268 0277 0043 A        .WORD    'C'/256
269 0278 03AD T        .WORD    CHAR
270 0279 0054 A        .WORD    'T'/256
271 027A 03AB T        .WORD    TYPE
272 027B 004D A        .WORD    'M'/256
273 027C 036A T        .WORD    MOVE
274 027D 0047 A        .WORD    'G'/256
275 027E 033E T        .WORD    GO
276 027F 0048 A        .WORD    'H'/256
277 0280 02B1 T        .WORD    HALT
278 0281 0046 A        .WORD    'F'/256
279 0282 0383 T        .WORD    FIND
280 0283 004E A        .WORD    'N'/256
281 0284 039E T        .WORD    NOTE
282 0285 0053 A        .WORD    'S'/256
283 0286 02D1 T        .WORD    SNAP
284 0287 0052 A        .WORD    'R'/256
285 0288 02A3 T        .WORD    RESET
286 0289 005F A        .WORD    BS
287 028A 03A2 T        .WORD    BSCODE
288 028B 000A A        .WORD    LF
289 028C 03A5 T        .WORD    LFCODE
290 028D 000D A        .WORD    CR
291 028E 03A6 T        .WORD    CRCODE
292 028F 0000 A CEND:  .WORD    0
293 0290 0291 T AERADR: .WORD    AEREX

294 0291                .PAGE
295 0291                .LOCAL

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DEBUG

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296 0291          ; STANDARD ERROR EXIT
297 0291 4C3F A AEREX:  LI      R0,QMARK      ; '?'
298 0292 2101 A          JMP      ERR
299 0293 4C23 A ESC:    LI      R0,HMARK      ; '#'
300 0294 2F07 A ERR:    JSR      @LPUTC(R3)    ;OUTPUT CHAR
301 0295 2F06 A          JSR      @LPCRLF(R3)
302 0296          ; CLEAR STACK
303 0296          CLEAR:
304 0296 4E10 A          LI      R2,STKSZ
305 0297 4400 A $2:     PULL     R0
306 0298 4AFF A          AISZ     R2,-1
307 0299 21FD A          JMP      $2
308 029A 21C4 A          JMP      OUT
309 029B 0293 T ESCADR: .WORD    ESC
310 029C 0275 T CTADR:  .WORD    CTAB          ; CTAB ADDRESS
311 029D 029E T OVRADR: .WORD    OVER
312 029E          OVER:
313 029E 2F06 A          JSR      @LPCRLF(R3)
314 029F 8102 A          LD       R0,VOV
315 02A0 2F05 A          JSR      @LPUT2C(R3)   ;OUTPUT 2 CHAR
316 02A1 21F4 A          JMP      CLEAR        ;CLEAR STACK
317 02A2 4F56 A VOV:    .WORD    'OV'         ;OVER TABLE SIZE

318 02A3          .PAGE
319 02A3          ; RESET HALT/LOOPS
320 02A3          .LOCAL
321 02A3          RESET:
322 02A3 2F0C A          JSR      @LINPUT(R3)   ;ASSUME CR
323 02A4 4E00 A          LI      R2,0
324 02A5 AB27 A          ST       R2,HENT(R3)
325 02A6 8B2C A          LD       R2,HRBASE(R3) ; RESTORE H/R PTR
326 02A7 AB2B A          ST       R2,HRPTR(R3)
327 02A8 8B28 A          LD       R2,HPTR(R3)   ; HALT TABLE PTR
328 02A9 F906 A $1:     SKNE     R2,HBASEB      ; ANY ENTRIES
329 02AA 2713 A          JMP      @LALPHA(R3)   ;EMPTY-EXIT
330 02AB 4AFC A          AISZ     R2,-4         ; PTR ALWAYS +2
331 02AC AB28 A          ST       R2,HPTR(R3)   ; UPDATE HPTR
332 02AD 8601 A          LD       R1,1(R2)      ; CODE REPLACES
333 02AE B600 A          ST       R1,@(R2)      ; REPLACED
334 02AF 21F9 A          JMP      $1           ;ANY MORE
335 02B0          ;
336 02B0 03CF T HBASEB: .WORD    HTAB

337 02B1          .PAGE
338 02B1          .LOCAL
339 02B1 2F16 A HALT:    JSR      @LHOK(R3)
340 02B2          ; R3 HAS HPTR
341 02B2 8324 A          LD       R0,LCHAR(R3)
342 02B3 F31D A          SKNE     R0,VCOM(R3)
343 02B4 210C A          JMP      $1
344 02B5          ; NOT COMMA
345 02B5 4D00 A          LI      R1,0
346 02B6 4C00 A $2:     LI      R0,0
347 02B7 8B28 A          LD       R2,HPTR(R3)
348 02B8 A602 A          ST       R1,2(R2)      ; STOP FIRST TIME
349 02B9 A203 A          ST       R0,3(R2)
350 02BA 2F0A A          JSR      @LTCRLF(R3)
351 02BB 271F A          JMP      @EXPEX(R3)
352 02BC 8730 A          LD       R1,HCODE(R3)   ;RUN CODE HALT
353 02BD B600 A REPLAC: ST       R1,@(R2)
354 02BE 4A04 A          AISZ     R2,4
355 02BF AB28 A          ST       R2,HPTR(R3)
356 02C0 2713 A          JMP      @LALPHA(R3)

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DEBUG

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357 02C1 2F0C A $1:      JSR      @LINPUT(R3)
358 02C2 2F0B A          JSR      @LEXPR(R3)
359 02C3 21F2 A          JMP      $2
360 02C4                ;
361 02C4                ; EVALUATE LOCATION OF HALT/LOOP IT MUST NOT BE 'R'.
362 02C4                ; ALSO VERIFY ROOM AVAILABLE
363 02C4 872A A HOK:      LD        R1,HMAX(R3)
364 02C5 E728 A          SKG        R1,HPTR(R3)
365 02C6 2720 A          JMP        @OVREX(R3)          ;TOO MANY
366 02C7 2F0C A          JSR      @LINPUT(R3)
367 02C8 2F0F A          JSR      @LADDR(R3)
368 02C9 B728 A          ST         R1,@HPTR(R3)        ;STORE LOC
369 02CA 2F09 A          JSR      @LRTEST(R3)
370 02CB 271F A          JMP        @EXPEX(R3)          ;WAS 'R'
371 02CC 3681 A          RCPY       R1,R2
372 02CD 8200 A          LD         R0,(R2)             ;LODE CODE
373 02CE 8B28 A          LD         R2,HPTR(R3)
374 02CF A201 A          ST         R0,1(R2)           ; SAVE CODE
375 02D0 0200 A          RTS        0

376 02D1                .PAGE
377 02D1                .LOCAL
378 02D1 2F16 A SNAP:     JSR      @LHOK(R3)            ;EVAL LOC
379 02D2 8324 A          LD         R0,LCHAR(R3)
380 02D3 F31D A          SKNE       R0,VCOM(R3)
381 02D4 2101 A          JMP        $1
382 02D5                ; PREPARE FOR USE OF RANGE EVAL
383 02D5 271F A          JMP        @EXPEX(R3)
384 02D6 832B A $1:      LD         R0,HRPTR(R3)
385 02D7 8B28 A          LD         R2,HPTR(R3)
386 02D8 A202 A          ST         R0,2(R2)           ; SAVE HRANGE
387 02D9 872D A          LD         R1,HRMAX(R3)
388 02DA 2F17 A          JSR      @LRANGE(R3)           ;R0 HRPTR
389 02DB                ;R1 HRMAX
390 02DB 8B28 A          LD         R2,HPTR(R3)
391 02DC 8321 A          LD         R0,RPTR(R3)         ; SAVE LAST
392 02DD A32B A          ST         R0,HRPTR(R3)
393 02DE 48FE A          AISZ       R0,-2              ;RANGE POINTER
394 02DF A203 A          ST         R0,3(R2)
395 02E0 2F0A A          JSR      @LTCRLF(R3)           ;TEST IF OK
396 02E1 271F A          JMP        @EXPEX(R3)         ;TO REPLACE CODE
397 02E2 872E A          LD         R1,SCODE(R3)       ;REPLACE
398 02E3 21D9 A          JMP        REPLACE

399 02E4                .PAGE
400 02E4                ;
401 02E4                ; USER PRINT CALL
402 02E4                ;
403 02E4                .LOCAL
404 02E4 02E5 T $RET:     .=. +1
405 02E5 2C14 B UCALL:    JSR@      SAVRIA
406 02E6 4801 A          AISZ       R0,1              ;SAVE RETURN ADDRESS
407 02E7 A1FC A          ST         R0,$RET
408 02E8 4E00 A          LI         R2,0              ; HEX OUTPUT
409 02E9 AB25 A          ST         R2,FMT(R3)
410 02EA 91F9 A          LD         R0,$RET            ;LOAD BASE
411 02EB 79F8 A          ISZ        $RET
412 02EC 95F7 A          LD         R1,$RET            ;LOAD TOP
413 02ED 79F6 A          ISZ        $RET              ;SET UP RETURN
414 02EE 2F11 A          JSR      @LOUTPUT(R3)
415 02EF 81F4 A          LD         R0,$RET
416 02F0 2712 A          JMP        @LRESTOR(R3)

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417 02F1          .PAGE
418 02F1          .LOCAL
419 02F1          ;
420 02F1          ; CONTROL COMES HERE WHEN HALT
421 02F1          ; LOCATION IS EXECUTED
422 02F1          ;
423 02F1 2C14 B HRUN: JSR@ SAVRIA          ;SAVE REGISTERS
424 02F2 A322 A      ST      R0,CL(R3)      ;SAVE LOCATION OF HALT
425 02F3 A126 A      ST      R0,HRET
426 02F4          ; FIND HALT ENTRY IN H TABLE
427 02F4 8125 A      LD      R0,HRET
428 02F5 8B29 A      LD      R2,HBASE(R3)
429 02F6 F200 A $1:  SKNE     R0,(R2)
430 02F7 2102 A      JMP      $2
431 02F8 4A04 A      AISZ     R2,4
432 02F9 21FC A      JMP      $1          ;HAS TO BE THERE
433 02FA          ; ENTRY FOUND
434 02FA AB27 A $2:  ST      R2,HENT(R3)      ;SAME TABLE ENTRY
435 02FB 8331 A      LD      R0,HCODEB(R3)
436 02FC A333 A      ST      R0,CODEB(R3)
437 02FD 7A03 A      ISZ      3(R2)          ;INCREMENT ITERATIONS
438 02FE 8602 A      LD      R1,2(R2)
439 02FF E603 A      SKG      R1,3(R2)
440 0300 2101 A      JMP      HFND          ;HALT N&W
441 0301 2119 A      JMP      HCONTU       ;CONTINUE
442 0302          ;HALT
443 0302 4C00 A HFND:  LI      R0,0
444 0303 A203 A      ST      R0,3(R2)      ;RESET COUNT
445 0304          ; PRINT CURRENT LOCATION
446 0304 2931 A      JSR      PHRET
447 0305 2713 A      JMP      @LALPHA(R3)

448 0306          .PAGE
449 0306          .LOCAL
450 0306          ;
451 0306          ; CONTROL COMES HERE WHEN SNAP LOC IS EXECUTED
452 0306          ;
453 0306 2C14 B SRUN:  JSR@ SAVRIA          ;SAVE REGISTERS
454 0307 A322 A      ST      R0,CL(R3)      ;SAVE LOCATION OF SNAP
455 0308 A111 A      ST      R0,HRET
456 0309          ; FIND SNAP ENTRY IN HTABLE
457 0309 8110 A      LD      R0,HRET
458 030A 8B29 A      LD      R2,HBASE(R3)
459 030B F200 A $1:  SKNE     R0,(R2)
460 030C 2102 A      JMP      $2
461 030D 4A04 A      AISZ     R2,4
462 030E 21FC A      JMP      $1          ;MUST BE HERE
463 030F          ; ENTRY FOUND
464 030F AB27 A $2:  ST      R2,HENT(R3)
465 0310 832F A      LD      R0,SCODEB(R3)
466 0311 A333 A      ST      R0,CODEB(R3)
467 0312 2923 A      JSR      PHRET          ;PRINT LOC
468 0313 8B27 A      LD      R2,HENT(R3)
469 0314 8603 A      LD      R1,3(R2)      ; TOP RANGE+2
470 0315 B704 A      ST      R1,@APTOP(R3)
471 0316 8A02 A      LD      R2,2(R2)      ;BASE RANGE
472 0317 2F10 A      JSR      @LPRANGE(R3)
473 0318 2F06 A      JSR      @LPCRLF(R3)
474 0319 2101 A      JMP      HCONTU

475 031A          .PAGE
476 031A          ;
477 031A          ; CONTROL COMES HERE WHEN USER INSTRUCTION IS TO BE EXECUTED IN A

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478 031A      ; HALT/SNAP LOC. THE LOCATION AFTER THE HALT/SNAP IS SET TO EXIT
479 031A      ; TO HRUNB/SRUNB; THE SNAP/HLT LOCATION IS RESTORED TO ITS
480 031A      ; ORIGINAL CONTENTS
481 031A      ;
482 031A
483 031A 031B T HRET:      .=.+1      ;DON'T DEPEND ON R3 TO GET HALT
484 031B 8B27 A HCONTU: LD      R2,HENT(R3) ;HALT RETURN LOC
485 031C 8201 A          LD      R0,1(R2) ;TABLE ENTRY OF HALT
486 031D B200 A          ST      R0,@(R2) ;RESTORE USER CODE
487 031E 8333 A          LD      R0,CODEB(R3) ;SECOND HALT
488 031F 8E00 A          LD      R3,(R2) ;CODE LOC
489 0320 8701 A          LD      R1,1(R3) ;HALT +1 CODE
490 0321 A601 A          ST      R1,1(R2) ;SAME
491 0322 A301 A          ST      R0,1(R3) ;NEW HALT AT L+1
492 0323 81F6 A          LD      R0,HRET
493 0324 2415 B          JMP@     RSTRIA
494 0325      ;
495 0325      ;
496 0325      .LOCAL
497 0325      ;
498 0325      ; THESE ARE EXECUTED IMMEDIATELY AFTER THE USERS INSTRUCT. IN THE
499 0325      ; HALT/SNAP LOCATION.HRUNB/SRUNB MERELY INIT. 'CODE' FOR USE BY
500 0325      ; THE COMMON CODE RUNB
501 0325      ;
502 0325 2C14 B HRUNB: JSR@     SAVRIA      ;SAVE REGISTERS
503 0326 8730 A          LD      R1,HCODE(R3)
504 0327 2103 A          JMP      RUNB
505 0328 2C14 B SRUNB: JSR@     SAVRIA
506 0329 872E A          LD      R1,SCODE(R3)
507 032A 2100 A          JMP      RUNB
508 032B      ;
509 032B      ; CONTROL COMES HERE AFTER INSTRUCTION IN HALT/SNAP LOC. IS
510 032B      ; EXECUTED. IT WILL BE ALTERED TO EXIT TO HRUN/SRUN; THE LOCATION
511 032B      ; FOLLOWING THE HALT/SNAP WILL BE RESTORED
512 032B      ;
513 032B      ; SECOND HALT TO RESTORE HALT AT PREVIOUS LOC
514 032B A1EE A RUNB: ST      R0,HRET
515 032C A732 A          ST      R1,CODE(R3)
516 032D 8B27 A          LD      R2,HENT(R3) ;LOC OF LAST H TAB
517 032E 8DEB A          LD      R3,HRET ;LOC OF HALT B
518 032F      ; REPLACE CURRENT HALT B WITH ITS CODE
519 032F 8201 A          LD      R0,1(R2)
520 0330 A300 A          ST      R0,(R3)
521 0331      ; REPLACE HALT
522 0331 83FF A          LD      R0,-1(R3) ;CODE AT HALT A LOC
523 0332 A201 A          ST      R0,1(R2)
524 0333 A7FF A          ST      R1,-1(R3) ;STORE CODE AT HALT
525 0334 81E5 A          LD      R0,HRET
526 0335 2415 B          JMP@     RSTRIA

527 0336      .PAGE
528 0336      OUTCL:
529 0336      PHRET:
530 0336      ;ASCII FORMAT
531 0336 2F06 A          JSR      @LPCRLF(R3)
532 0337 8105 A          LD      R0,CLCHAR
533 0338 2F05 A          JSR      @LPUT2C(R3)
534 0339 2F14 A          JSR      @LPUTBLK(R3)
535 033A 8322 A          LD      R0,CL(R3)
536 033B 2F15 A          JSR      @LPUT4H(R3)
537 033C 0200 A          RTS      0
538 033D 434C A CLCHAR: .WORD    'CL'

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DEBUG

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539 033E          .PAGE
540 033E          .LOCAL
541 033E 2F0C A GO: JSR      @LINPUT(R3)
542 033F 2F0A A     JSR      @LTCRLF(R3)
543 0340 2104 A     JMP      GOLOC
544 0341 4C00 A $1:  LI       R0,0
545 0342 F327 A     SKNE     R0,HENT(R3)
546 0343 271F A     JMP      @EXPEX(R3)      ;MUST BE LOC
547 0344 21D6 A     JMP      HCONTU
548 0345 2F0F A GOLOC: JSR      @LADDR(R3)
549 0346 3481 A     RCPY     R1,R0      ;ADDR TO R0
550 0347 2712 A     JMP      @LRESTOR(R3)

551 0348          .PAGE
552 0348 0403 T DRPTR: .WORD    DRTAB      ;DUMP RANGE POINTER
553 0349 0403 T DRBASE: .WORD    DRTAB      ;DUMP RANGE BASE LOCATION
554 034A 0415 T DRMAX:  .WORD    DRS2-1*2+DRTAB ;DUMP RANGE TAB MAX ENTRY
555 034B          .LOCAL
556 034B          ALTER:
557 034B 2F0C A     JSR      @LINPUT(R3)      ;GET CHAR
558 034C 2F0D A     JSR      @LRCHAR(R3)      ;SET RWORD
559 034D 2F0C A     JSR      @LINPUT(R3)
560 034E 2F0F A     JSR      @LADDR(R3)
561 034F A722 A     ST       R1,CL(R3)      ;SAVE LOC
562 0350 F116 A     SKNE     R0,VCOMM      ;VERIFY COMMA
563 0351 210F A     JMP      $9
564 0352 271F A     JMP      @EXPEX(R3)
565 0353 2F1A A ELOOP: JSR      @LPUTADR(R3)      ;PRINT ADR
566 0354 2F0C A $6:  JSR      @LINPUT(R3)
567 0355 2F0E A     JSR      @LVALUE(R3)      ;STR OR EXP
568 0356 2F0A A     JSR      @LTCRLF(R3)
569 0357 210C A     JMP      $8      ;ENOR EXIT
570 0358 B722 A $7:  ST       R1,@CL(R3)      ;STORE VALUE
571 0359 F10E A     SKNE     R0,VCR0
572 035A 2713 A     JMP      @LALPHA(R3)
573 035B 2F1B A     JSR      @LRD0(R3)      ;TEST FOR REG
574 035C          ;AND INC CL IF OK
575 035C 8324 A     LD       R0,LCHAR(R3)
576 035D F109 A     SKNE     R0,VCOMM      ; CONTINUE INPUT WITHOUT PROMPT
577 035E 21F5 A     JMP      $6
578 035F 8322 A     LD       R0,CL(R3)
579 0360 21F2 A     JMP      ELOOP
580 0361 4C00 A $9:  LI       R0,0
581 0362 A323 A     ST       R0,RWORD(R3)
582 0363 21F0 A     JMP      $6
583 0364          ;
584 0364          ; MULTIPLE WORD ALTER WITHOUT REPROMPT
585 0364          ; TEST FOR COMMA
586 0364 F102 A $8:  SKNE     R0,VCOMM
587 0365 21F2 A     JMP      $7
588 0366 271F A     JMP      @EXPEX(R3)
589 0367 002C A VCOMM: .WORD    ', '/256
590 0368 000D A VCR0:  .WORD    CR

591 0369          .PAGE
592 0369          .LOCAL
593 0369 036A T FVALU: .=. +1
594 036A 2F0C A MOVE: JSR      @LINPUT(R3)      ;GET FIRST CHAN
595 036B 2F0E A     JSR      @LVALUE(R3)
596 036C F1FA A     SKNE     R0,VCOMM      ; VERIFY COMMA
597 036D 2101 A     JMP      $0
598 036E 271F A     JMP      @EXPEX(R3)
599 036F          $0:

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600 036F A5F9 A      ST      R1,FVALU      ;SAVE
601 0370 81D8 A      LD      R0,DRBASE
602 0371 8510 A      LD      R1,DRTOP
603 0372          ; SET UP RANGE PARAMS
604 0372 2F17 A      JSR      @LRANGE(R3)
605 0373 2F0A A      JSR      @LTCRLF(R3)
606 0374 271F A      JMP      @EXPEX(R3)
607 0375 81F3 A      LD      R0,FVALU
608 0376 89D2 A      LD      R2,DRBASE
609 0377 8600 A $2:   LD      R1,(R2)      ;ADDR TO STORE VALUE
610 0378 3680 A $1:   RXCH    R1,R2      ;PUT ADDR IN R2
611 0379 A200 A      ST      R0,(R2)
612 037A 3680 A      RXCH    R1,R2      ;PUT WORKING RPTR IN R2
613 037B 4901 A      AISZ    R1,1      ;INCREMENT ADDR
614 037C E601 A      SKG     R1,1(R2)
615 037D 21FA A      JMP     $1
616 037E 4A02 A      AISZ    R2,2
617 037F FB21 A      SKNE    R2,RPTR(R3)
618 0380 2713 A      JMP     @LALPHA(R3)
619 0381 21F5 A      JMP     $2
620 0382          ;
621 0382          ; SAME AS DRBASA AND DRMAX
622 0382          ; TOP IS LAST ENTRY OF TABLE TO BE FILLED
623 0382          ;
624 0382 0415 T DRTOP: .WORD    DRSZ-1*2+DRTAB
625 0383          .PAGE
626 0383          .LOCAL
627 0383 2F0C A FIND: JSR      @LINPUT(R3)
628 0384 2F0E A      JSR      @LVALUE(R3)
629 0385 A5E3 A      ST      R1,FVALU
630 0386 81C2 A      LD      R0,DRBASE
631 0387 85FA A      LD      R1,DRTOP
632 0388          ; RANGE DOES INPUT OF FIRST CHAR REQUIRED
633 0388 2F17 A      JSR      @LRANGE(R3)
634 0389 2F0A A      JSR      @LTCRLF(R3)
635 038A 271F A      JMP      @EXPEX(R3)
636 038B 7F21 A      DSZ     RPTR(R3)
637 038C 7F21 A      DSZ     RPTR(R3)
638 038D 89BB A      LD      R2,DRBASE
639 038E 8600 A $2:   LD      R1,(R2)
640 038F 3680 A $1:   RXCH    R1,R2      ; PUT ADDR IN R2
641 0390 8200 A      LD      R0,(R2)    ;GET NEXT LOC IN RANGE
642 0391 3680 A      RXCH    R1,R2      ; PUT WORKING RPTR IN R2
643 0392 F1D6 A      SKNE    R0,FVALU
644 0393 2107 A      JMP     SFND
645 0394 4901 A      AISZ    R1,1
646 0395 E601 A      SKG     R1,1(R2)
647 0396 21F8 A      JMP     $1
648 0397 4A02 A      AISZ    R2,2
649 0398 EB21 A      SKG     R2,RPTR(R3) ; LAST RANGE PAIR?
650 0399 21F4 A      JMP     $2
651 039A 2713 A      JMP     @LALPHA(R3)
652 039B A722 A SFND: ST      R1,CL(R3)    ; LOC FOUND IS CL
653 039C 2F1C A      JSR     @LOUTCL(R3)
654 039D 2713 A      JMP     @LALPHA(R3)
655 039E          ; TEMP INDEX INTO RANGE TABLE

656 039E          .PAGE
657 039E 2F0C A NOTE: JSR      @LINPUT(R3)
658 039F 2F0A A      JSR      @LTCRLF(R3)
659 03A0 21FD A      JMP     NOTE      ;NOT CR/LF
660 03A1 2713 A      JMP     @LALPHA(R3)
661 03A2          ;

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662 03A2      ;
663 03A2      ;
664 03A2 2F06 A BSCODE: JSR      @LPCRLF(R3)
665 03A3 4DFF A      LI      R1,-1
666 03A4 A726 A      ST      R1,DELTA(R3)      ;DECREMENT
667 03A5      ;
668 03A5 2F1B A LFCODE: JSR      @LRD0(R3)      ;INCREMENT VALID
669 03A6      ;
670 03A6 8322 A CRCODE: LD      R0,CL(R3)
671 03A7 2F1A A      JSR      @LPUTADR(R3)
672 03A8 9322 A      LD      R0,@CL(R3)
673 03A9 2F19 A      JSR      @LOUTW(R3)
674 03AA 2713 A      JMP      @LALPHA(R3)
675 03AB      ;
676 03AB      ;
677 03AB      .LOCAL
678 03AB 4D00 A TYPE:  LI      R1,0
679 03AC 2101 A      JMP      $1
680 03AD 4D01 A CHAR:  LI      R1,1
681 03AE A725 A $1:   ST      R1,FMT(R3)      ; ASCII FORMAT
682 03AF 8199 A      LD      R0,DRBASE
683 03B0 85D1 A      LD      R1,DRTOP
684 03B1      ; RANGE REQUIRES BASE/TOP OF TABLE
685 03B1      ; IT WILL FILL
686 03B1 2F17 A      JSR      @LRANGE(R3)
687 03B2 2F0A A      JSR      @LTCRLF(R3)      ; TEST FOR CR/LF
688 03B3 271F A      JMP      @EXPEX(R3)      ; ERROR EXIT
689 03B4 8B21 A      LD      R2,RPTR(R3)      ; NEXT RANGE LOC
690 03B5 4AFE A      AISZ     R2,-2      ; LAST OF CONCERN
691 03B6 BB04 A      ST      R2,@APTOP(R3)      ; PRANGE PARAM
692 03B7 8991 A      LD      R2,DRBASE
693 03B8 2F10 A      JSR      @LPRANGE(R3)      ; PRINT RANGE
694 03B9 2713 A      JMP      @LALPHA(R3)

695 03BA      .PAGE
696 03BA 03CF T REGA:  .=.+21
697 03CF 03EF T HTAB:  .=HSZ*4+.      ;H/L TABLE
698 03EF 0403 T HRTAB: .=HRSZ*2+.      ;HR TABLE
699 0403 0417 T DRTAB: .=DRSZ*2+.      ;DR TABLE

700 0417      .PAGE
701 0417      .LOCAL
702 0417 290A A INPUT: JSR      GETC
703 0418 F105 A      SKNE     R0,NULL
704 0419 21FD A      JMP      INPUT
705 041A F102 A      SKNE     R0,BLANK      ;SKIP TO NON BLANK
706 041B 21FB A      JMP      INPUT
707 041C 0200 A      RTS      0
708 041D 0020 A BLANK: .WORD    ' /256
709 041E 0000 A NULL:  .WORD    0
710 041F 007F A H7F:  .WORD    X'7F
711 0420 FFF5 A DELAY  =      0FFF5
712 0420 FFF6 A DELAY1 =      0FFF6
713 0420 2920 A LECHOI: JSR      LTECHO-3
714 0421 7E73 A PTECHO: .WORD    07E73
715 0422 2942 A GETC:  JSR      SAVE
716 0423 2DFD A ECHOA: JSR@     PTECHO
717 0424 A162 A      ST      0,SRREG
718 0425 2950 A      JSR      REST
719 0426 61F8 A      AND      0,H7F
720 0427 A324 A      ST      R0,LCHAR(R3)
721 0428      .ENDIF
722 0428 F16A A      SKNE     R0,VLF      ;LF

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DEBUG

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723 0429 217E A      JMP      PCR
724 042A F167 A      SKNE     R0,VCR      ;CR
725 042B 2416 I      JMP      PLF
726 042C F164 A      SKNE     R0,VESC      ;ESC
727 042D 271E A      JMP      @ESCEX(R3)
728 042E 0200 A      RTS       0
729 042F              .IF -IMPL6

730 042F              .PAGE
731 042F              .LOCAL
732 042F 0038 A TTYAD =      7*8
733 042F 0A80 A LTTYT: PFLG   2
734 0430 4C30 A      LI       0,X'30
735 0431 03F6 A      JSRI     DELAY1
736 0432 4E09 A $0:   LI       2,9
737 0433 0A80 A      PFLG     2
738 0434 4C00 A      LI       0,0
739 0435 4F38 A      LI       3,TTYAD
740 0436 0603 A      ROUT     3
741 0437 58FF A      ROR      0,1
742 0438 03F5 A $2:   JSRI     DELAY
743 0439 5829 A      ROL      0,TA
744 043A 4AFF A $3:   AISZ     2,-1
745 043B 2101 A      JMP      $5
746 043C 2104 A      JMP      $7
747 043D 59FF A $5:   ROR      1,1
748 043E 3481 A      RCPY     1,0
749 043F 0603 A $6:   ROUT     3
750 0440 21F7 A      JMP      $2
751 0441 4CFF A $7:   LI       0,-1
752 0442 0603 A      ROUT     3
753 0443 0200 A      RTS

754 0444              .PAGE
755 0444              .LOCAL
756 0444 4F38 A LTECHO: LI      3,TTYAD
757 0445 0A80 A      PFLG     2
758 0446 0605 A      ROUT     5
759 0447 4E08 A      LI       2,8
760 0448 0402 A      RIN      2
761 0449 0604 A      ROUT     4
762 044A 1201 A      BOC      2,.,+2
763 044B 21FC A      JMP      .-3
764 044C 4C09 A      LI       0,EA
765 044D 03F6 A      JSRI     DELAY1
766 044E 58EA A      ROR      0,EB
767 044F 0402 A      RIN      2
768 0450 1201 A      BOC      2,.,+2
769 0451 21F3 A      JMP      LTECHO+1
770 0452 0603 A $14: ROUT     3
771 0453 03F5 A      JSRI     DELAY
772 0454 5826 A      ROL      0,EC
773 0455 0402 A      RIN      2
774 0456 610D A      AND      0,$M
775 0457 5DFF A      SHR      1,1
776 0458 3182 A      RXOR     0,1
777 0459 4AFF A      AISZ     2,-1
778 045A 21F7 A      JMP      $14
779 045B 0603 A      ROUT     3
780 045C 03F5 A      JSRI     DELAY
781 045D 4CFF A      LI       0,-1
782 045E 0603 A      ROUT     3
783 045F 03F5 A      JSRI     DELAY

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784 0460 0605 A      ROUT      5
785 0461 5DF8 A      SHR       1,8
786 0462 3481 A      RCPY      1,0
787 0463 0200 A      RTS
788 0464 8000 A $M:   .WORD     X'8000

789 0465              .PAGE
790 0465 A121 A SAVE: ST        0,$R
791 0466 A521 A      ST        1,$R+1
792 0467 A921 A      ST        2,$R+2
793 0468 AD21 A      ST        3,$R+3
794 0469 4700 A      PULL      3
795 046A 4400 A      PULL      0
796 046B A120 A      ST        0,$R+5
797 046C 4400 A      PULL      0
798 046D A11F A      ST        0,$R+6
799 046E 4400 A      PULL      0
800 046F A11E A      ST        0,$R+7
801 0470 4400 A      PULL      0
802 0471 A11D A      ST        0,$R+8
803 0472 4400 A      PULL      0
804 0473 A11C A      ST        0,$R+9
805 0474 8112 A      LD        0,$R
806 0475 2300 A      JMP        (3)
807 0476 4700 A REST: PULL      3
808 0477 8118 A      LD        0,$R+9
809 0478 4000 A      PUSH      0
810 0479 8115 A      LD        0,$R+8
811 047A 4000 A      PUSH      0
812 047B 8112 A      LD        0,$R+7
813 047C 4000 A      PUSH      0
814 047D 810F A      LD        0,$R+6
815 047E 4000 A      PUSH      0
816 047F 810C A      LD        0,$R+5
817 0480 4000 A      PUSH      0
818 0481 4300 A      PUSH      3
819 0482 8104 A      LD        0,$R
820 0483 8504 A      LD        1,$R+1
821 0484 8904 A      LD        2,$R+2
822 0485 8D04 A      LD        3,$R+3
823 0486 0200 A      RTS
824 0487              SRREG:
825 0487 0491 T $R:   .=. +10
826 0491              .ENDIF
827 0491 007D A VESC: .WORD     X'7D
828 0492 000D A VCR:  .WORD     CR
829 0493 000A A VLF:  .WORD     LF

830 0494              .PAGE
831 0494              .LOCAL
832 0494 2995 A LTYPEI: JSR          LTTYT-5
833 0495 7E59 A PTTYT:  .WORD      07E59
834 0496 6137 A PUTC:   AND        0,VFF
835 0497 29CD A      JSR          SAVE
836 0498 3181 A      RCPY      0,1
837 0499 2DFB A TYPEA: JSR@      PTTYT
838 049A 4F00 A      LI         R3,0
839 049B 0406 A      RIN        6
840 049C 5C08 A      SHL        0,8
841 049D 1204 A      BOC        2,$1
842 049E 4F38 A      LI         R3,TTYAD
843 049F 0605 A      ROUT      5
844 04A0 29D5 A      JSR        REST

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DEBUG

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845 04A1 2103 A      JMP      $2+1
846 04A2 29D3 A $1:   JSR      REST
847 04A3 0200 A      RTS
848 04A4             .ENDIF
849 04A4 8D02 A $2:   LD        R3,GTEMP
850 04A5 4400 A      PULL      R0
851 04A6 271E A      JMP      @ESCEX(R3)
852 04A7             ;ESC CHAR
853 04A7 04A8 T GTEMP: .=. +1

854 04A8             .PAGE
855 04A8 4C0D A PCR:  LI        R0,CR           ;OUTPUT CR
856 04A9 2F07 A PCR1: JSR      @LPUTC(R3)
857 04AA 8324 A      LD        R0,LCHAR(R3)    ;R0 HAS LCHAR
858 04AB 0200 A      RTS        0
859 04AC             ;
860 04AC             PLFCR:
861 04AC 29FB A PCRLF: JSR      PCR           ;OUTPUT CR/LF
862 04AD 4C0A A PLF:  LI        R0,LF         ;OUTPUT LF
863 04AE 21FA A      JMP      PCR1

864 04AF             .PAGE
865 04AF             .LOCAL
866 04AF             ; OUTPUT R0 ACCORDING TO FMT
867 04AF             ; FMT =0   HEX
868 04AF             ; FMT =1   ASCII
869 04AF             ;
870 04AF             OUTW:
871 04AF 4D00 A      LI        R1,0
872 04B0 F725 A      SKNE      R1,FMT(R3)
873 04B1 2109 A      JMP      OUTHEX
874 04B2             ;
875 04B2             ; OUTPUT 2 CHARS IN R0
876 04B2             ;
877 04B2             PUT2C:
878 04B2 A107 A      ST        R0,$TEMP
879 04B3 5CF8 A      SHR      R0,8           ;FIRST CHAR
880 04B4 6119 A      AND      R0,VFF
881 04B5 2F07 A      JSR      @LPUTC(R3)
882 04B6 8103 A      LD        R0,$TEMP
883 04B7 6116 A      AND      R0,VFF
884 04B8 2F07 A      JSR      @LPUTC(R3)
885 04B9 0200 A      RTS        0
886 04BA 04BB T $TEMP: .=. +1
887 04BB             ;
888 04BB             ; OUTPUT R0 AS 4 HEX CHAR
889 04BB             ;
890 04BB             PUT4H:
891 04BB             OUT4H:
892 04BB 4DFC A OUTHEX: LI        R1,-4
893 04BC A50C A      ST        R1,$CNT
894 04BD A1FC A $1:   ST        R0,$TEMP
895 04BE 5CF4 A      SHR      R0,12
896 04BF 610D A      AND      R0,VF         ;GET CHAR
897 04C0 E10B A      SKG      R0,V9         ;FORM HEX
898 04C1 C108 A      ADD      R0,VC09       ;VC09='0'-'A'+10
899 04C2 C108 A      ADD      R0,VAM10      ;VAM9='A'-10
900 04C3 2F07 A      JSR      @LPUTC(R3)
901 04C4 81F5 A      LD        R0,$TEMP
902 04C5 5C04 A      SHL      R0,4
903 04C6 7902 A      ISZ      $CNT
904 04C7 21F5 A      JMP      $1
905 04C8 0200 A      RTS        0

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906 04C9 04CA T $CNT:      .=.+1
907 04CA FFF9 A VC09:      .WORD      X'30-X'41+10
908 04CB 0037 A VAM10:     .WORD      X'41-10
909 04CC 0009 A V9:        .WORD      9
910 04CD 000F A VF:        .WORD      X'F
911 04CE 00FF A VFF:       .WORD      X'FF

912 04CF                      .PAGE
913 04CF                      .LOCAL
914 04CF      ; TEST IF THE INCREMENT/DECREMENT OF CL REMAINS IN RANGE ALLOWED.
915 04CF 8722 A RD0:        LD          R1,CL(R3)
916 04D0 2F09 A            JSR          @LRTEST (R3)
917 04D1 2103 A            JMP          $2                      ; IN R
918 04D2 C726 A            ADD          R1,DELTA(R3)
919 04D3 A722 A $3:        ST          R1,CL(R3)
920 04D4 0200 A            RTS          0
921 04D5 C726 A $2:        ADD          R1,DELTA(R3)
922 04D6 2F09 A            JSR          @LRTEST (R3)
923 04D7      ; HAS TO BE IN R OR ERROR
924 04D7 21FB A            JMP          $3
925 04D8 271F A            JMP          @EXPEX(R3)
926 04D9      ;
927 04D9      ;
928 04D9      ; TEST CURRENT CHARACTER FOR LF,CR
929 04D9      ;
930 04D9 8324 A TCRLF:     LD          R0,LCHAR(R3)
931 04DA F1B8 A            SKNE         R0,VLF
932 04DB 0201 A            RTS          1
933 04DC F1B5 A            SKNE         R0,VCR
934 04DD 0201 A            RTS          1
935 04DE 0200 A            RTS          0                      ;NOT FOUND
936 04DF                      .LOCAL
937 04DF      ; TEST IF R1 VALUE IS IN REG
938 04DF      ; SAVE AREA
939 04DF E506 A RTEST:     SKG          R1,REGEND
940 04E0 2101 A            JMP          $1
941 04E1 0201 A            RTS          1                      ;NOT REG SAVE
942 04E2 E502 A $1:       SKG          R1,REGAM1
943 04E3 0201 A            RTS          1                      ;NOT REG SAVE
944 04E4 0200 A            RTS          0                      ;REG SAVE
945 04E5 03B9 T REGAM1:   .WORD      REGA-1
946 04E6 03CD T REGEND:   .WORD      REGA+19
947 04E7      ;
948 04E7      ; TEST FOR LF,CR,COMMA,COLON
949 04E7      ;
950 04E7                      .LOCAL
951 04E7 2F0A A TTERM:     JSR          @LTCRLF(R3)
952 04E8 2101 A            JMP          $1
953 04E9 0201 A            RTS          1                      ;FOUND
954 04EA      ; R0 CONTAINS CHARACTER AS A RESULT OF TLFCR
955 04EA F148 A $1:       SKNE         R0,VCOMMA
956 04EB 0201 A            RTS          1                      ;FOUND
957 04EC F145 A            SKNE         R0,VCOLON
958 04ED 0201 A            RTS          1                      ;FOUND
959 04EE 0200 A            RTS          0                      ;NOT FOUND

960 04EF                      .PAGE
961 04EF                      .LOCAL
962 04EF      ;
963 04EF      ; GET STRING OR EXPRESSION
964 04EF      ;
965 04EF 8324 A VALUE:     LD          R0,LCHAR(R3)
966 04F0 F110 A            SKNE         R0,VQU

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967 04F1 2102 A      JMP      PQUOTE
968 04F2 2F0B A      JSR      @LEXP(R3)
969 04F3 0200 A      RTS      0
970 04F4              ; STRING
971 04F4 4D00 A PQUOTE: LI      R1,0
972 04F5 A540 A      ST       R1,RESULT
973 04F6 2F08 A $1:   JSR      @LGETC(R3)
974 04F7              ; POSITION LAST CHAR
975 04F7 853E A      LD       R1,RESULT
976 04F8 F108 A      SKNE     R0,VQU
977 04F9 2105 A      JMP      $2
978 04FA 5D08 A STSTR: SHL      R1,8
979 04FB 6506 A      AND      R1,VFF00      ;R1 NEED RESULT
980 04FC 3182 A      RXOR     R0,R1
981 04FD A538 A      ST       R1,RESULT
982 04FE 21F7 A      JMP      $1
983 04FF 2F0C A $2:   JSR      @LINPUT(R3)      ;POSITION TO CHAR PAST LAST QUOTE
984 0500 0200 A      RTS      0
985 0501 0027 A VQU:   .WORD    '"/256
986 0502 FF00 A VFF00: .WORD    X'FF00
987 0503              ;
988 0503              ; EVALUATE EXPR AND DETERMINE
989 0503              ;IF VALID ADDR
990 0503              ;
991 0503              .LOCAL
992 0503 ADDR:
993 0503 2F0B A      JSR      @LEXP(R3)
994 0504 0200 A      RTS      0

995 0505              .PAGE
996 0505              ;INPUT:  R0      CURRENT ENTRY OF RANGE TABLE
997 0505              ;      R1      MAX RANGE TABLE ENTRY
998 0505              ;OUTPUT: RPTR (RANGE TABLE ENTRY) UPDATED TO CURRENT ENTRY
999 0505              ;      TABLE UPDATED
1000 0505              .LOCAL
1001 0505 A321 A RANGE: ST       R0,RPTR(R3)      ;CURRENT
1002 0506 A522 A      ST       R1,RMAX      ;MAX
1003 0507 2F0C A MORER: JSR      @LINPUT(R3)      ;NON/BLANK CHAR
1004 0508 4E00 A      LI      R2,0
1005 0509 AB23 A      ST       R2,RWORD(R3)      ;RESET REG LOC
1006 050A 8B21 A      LD       R2,RPTR(R3)
1007 050B E91D A      SKG      R2,RMAX      ;EXCEED TABLE
1008 050C 2101 A      JMP      $0
1009 050D 2720 A      JMP      @OVREX(R3)      ;SIZE
1010 050E $0:
1011 050E 2F0D A      JSR      @LRCHAR(R3)      ;TEST FOR 'R'
1012 050F              ;      AND UPDATE RWORD
1013 050F 2110 A      JMP      RR      ;FOUND
1014 0510              ; NOT AN 'R'
1015 0510 2F0F A $3:   JSR      @LADDR(R3)
1016 0511 B721 A $4:   ST       R1,@RPTR(R3)      ;STORE RESULT
1017 0512 F11F A      SKNE     R0,VCOLON      ;TEST FOR ':' SECOND HALF
1018 0513 2109 A      JMP      $2
1019 0514 8B21 A $1:   LD       R2,RPTR(R3)      ;SECOND
1020 0515 A601 A      ST       R1,1(R2)      ; 16 LOCATION
1021 0516 4A02 A      AISZ     R2,2      ; INCREMENT RANGE
1022 0517 AB21 A      ST       R2,RPTR(R3)
1023 0518 F11A A      SKNE     R0,VCOMMA      ;FINAL RANGE
1024 0519 21ED A      JMP      MORER      ;MORE RANGES
1025 051A 2F0A A      JSR      @LTCRLF(R3)
1026 051B 271F A      JMP      @EXPEX(R3)      ;NO
1027 051C 0200 A      RTS      0      ;YES
1028 051D              ; PROCESS SECOND PART OF RANGE

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1029 051D 2F0C A $2:      JSR      @LINPUT(R3)
1030 051E 2F0F A          JSR      @LADDR(R3)
1031 051F 21F4 A          JMP      $1          ;STORE SECOND
1032 0520          ; PROCESS R TO SEE IF ALL REGISTERS
1033 0520          ; GET NEXT PAST R
1034 0520 2F0C A RR:      JSR      @LINPUT(R3)
1035 0521 F111 A          SKNE     R0,VCOMMA
1036 0522 2102 A          JMP      RR1          ;COMMA YES
1037 0523 2F0A A          JSR      @LTCRLF(R3)
1038 0524 21EB A          JMP      $3          ;REGULAR
1039 0525          ; A COMPLETE REG DUMP REQUEST
1040 0525 850E A RR1:     LD        R1,REGADR      ;REG 0
1041 0526 B721 A          ST        R1,@RPTR(R3)
1042 0527 4913 A          AISZ     R1,19          ;REG 19
1043 0528 21EB A          JMP      $1
1044 0529          ; RANGE PERFORMS INPUT OF ALL CHAR IN RANGE
1045 0529          ; ESPECIALLY THE FIRST
1046 0529 052A T RMAX:    .=.+1

1047 052A          ; MAX ENTRY IS THE ENTRY BASE BEYOND END OF TABLE

1048 052A          .PAGE
1049 052A          .LOCAL
1050 052A          ; TEST LCHAR FOR 'R'
1051 052A          ; IF EQUAL SET RWORD < REGADR AND EXIT AT RET+0. ELSE EXIT AT RET+1.
1052 052A 8324 A RCHAR:   LD        R0,LCHAR(R3)
1053 052B F105 A          SKNE     R0,VR
1054 052C 2101 A          JMP      $1          'R'
1055 052D 0201 A          RTS        1
1056 052E 8105 A $1:     LD        R0,REGADR      ;UPDATE
1057 052F A323 A          ST        R0,RWORD(R3)   ;RWORD
1058 0530 0200 A          RTS        0          ;EXIT
1059 0531 0052 A VR:     .WORD     'R'/256
1060 0532 003A A VCOLON: .WORD     ':'/256
1061 0533 002C A VCOMMA: .WORD     ', '/256
1062 0534 03BA T REGADR: .WORD     REGA

1063 0535          .PAGE
1064 0535          .LOCAL
1065 0535          ; FIRST CHAR ASSUMED TO BE INPUT
1066 0535 0536 T CURR:    .=.+1          ;CURRENT SYSTEM
1067 0536 0537 T RESULT: .=.+1          ;EXPR RESULT
1068 0537 0538 T OP:     .=.+1          ;CURRENT OPERATOR
1069 0538 8324 A EXPR:   LD        R0,LCHAR(R3)
1070 0539 4D00 A          LI        R1,0          ;OPERATOR IS
1071 053A A5FA A          ST        R1,CURR      ;CURRENT SYNTAX
1072 053B A5FB A          ST        R1,OP       ;OPERATOR +
1073 053C A5F9 A          ST        R1,RESULT
1074 053D 2928 A          JSR      GETSYN      ;GET NEXT SYN
1075 053E 2104 A          JMP      VECTOR
1076 053F          ; ON FIRST ITEM BYPASS DUP SYN TEST
1077 053F ACHAR:
1078 053F 8324 A          LD        R0,LCHAR(R3)
1079 0540 2925 A ASYN:    JSR      GETSYN
1080 0541          ;
1081 0541          ; R2 HAS SYNTAX TYPE
1082 0541          ; R1 HAS SPECIAL BASED ON SYN TYPE
1083 0541          ; R0 HAS LCHAR
1084 0541          ;
1085 0541 F9F3 A          SKNE     R2,CURR      ;TEST FOR DUP
1086 0542 271F A          JMP      @EXPEX(R3)   ;ERROR EXIT
1087 0543          VECTOR:
1088 0543 C905 A          ADD        R2,OPADR

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1089 0544 2200 A          JMP          (R2)
1090 0545 2104 A OPVEC:   JMP          STOROP          ; 0 STORE OP
1091 0546 2107 A          JMP          PEROP           ; 1 PERFORM OP
1092 0547 210E A          JMP          EXPEXT          ; 2 EXIT
1093 0548 271F A          JMP          @EXPEX(R3)       ; 3 ERROR
1094 0549 0545 T OPADR:   .WORD        OPVEC
1095 054A          ; STORE NEW INTO CURRENT
1096 054A A5EC A STOROP:  ST          R1,OP
1097 054B          $2:
1098 054B D9FD A          SUB          R2,OPADR
1099 054C          ; VALUE IN R2 HAS BEEN MODIFIED TO FORM ADDRESS SO CHANGE BACK
1100 054C A9E8 A          ST          R2,CURR
1101 054D 21F1 A          JMP          ACHAR
1102 054E          ; PERFORM OP
1103 054E 81E8 A PEROP:   LD          R0,OP
1104 054F 4800 A          AISZ         R0,0           ;TEST IF 0
1105 0550 2103 A          JMP          MINUS
1106 0551 C5E4 A $4:      ADD          R1,RESULT
1107 0552 A5E3 A          ST          R1,RESULT
1108 0553 21F7 A          JMP          $2              ;STORE SYNTAX
1109 0554 5101 A MINUS:   CAI          R1,1
1110 0555 21FB A          JMP          $4
1111 0556          ; EXPR EXIT -- CANNOT BE OPERATOR LAST
1112 0556 8324 A EXPEXT:  LD          R0,LCHAR(R3)
1113 0557 8723 A $5:      LD          R1,RWORD(R3)
1114 0558 2F09 A          JSR          @LRTEST(R3)       ;REG

1115 0559 2105 A          JMP          $10             ;YES-MUST BE 0-19
1116 055A C5DB A $6:      ADD          R1,RESULT
1117 055B 89D9 A          LD          R2,CURR
1118 055C 4A00 A          AISZ         R2,0           ;TEST IF OPERATOR
1119 055D 0200 A          RTS          0
1120 055E 271F A          JMP          @EXPEX(R3)       ;YES ERROR
1121 055F          ; A REG ITEM IS 0 < R < 20
1122 055F 89D6 A $10:     LD          R2,RESULT
1123 0560 E91B A          SKG          R2,V19
1124 0561 2101 A          JMP          $11             ;RESET > 19
1125 0562 271F A          JMP          @EXPEX(R3)       ;ERROR
1126 0563 E949 A $11:     SKG          R2,VM1         ; >=0?
1127 0564 271F A          JMP          @EXPEX(R3)
1128 0565 21F4 A          JMP          $6

1129 0566          .PAGE
1130 0566          ; TO GET A VALID SYNTAX ITEM, INPUT R0 LAST CHAR, OUTPUT R0 NEW LAST CH
1131 0566          ; R1 NUM, OPERATOR TYPE, R2 SYNTAX ITEM.
1132 0566          .LOCAL
1133 0566 F113 A GETSYN:   SKNE         R0,VPLUS       ;PLUS ?
1134 0567 210E A          JMP          PLSCOD
1135 0568 F112 A          SKNE         R0,VMINUS       ;MINUS
1136 0569 2108 A          JMP          MINCOD
1137 056A 2914 A          JSR          GETNUM
1138 056B 210C A          JMP          $2              ;FOUND
1139 056C 2F18 A          JSR          @LTTERM(R3)
1140 056D 2102 A          JMP          $4
1141 056E 4E02 A          LI          R2,2             ;FOUND
1142 056F 0200 A          RTS          0
1143 0570 4E03 A $4:      LI          R2,3             ;NON SYN
1144 0571 0200 A          RTS          0
1145 0572 4D01 A MINCOD:   LI          R1,1             ;MIN OP
1146 0573 2F0C A $10:     JSR          @LINPUT(R3)      ;MOVE SCANNER POSITION
1147 0574 4E00 A $1:      LI          R2,0             ;OP SYN
1148 0575 0200 A          RTS          0
1149 0576 4D00 A PLSCOD:   LI          R1,0

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1150 0577 21FB A      JMP      $10
1151 0578 4E01 A $2:    LI      R2,1      ;OPERAND SYN
1152 0579 0200 A      RTS      0
1153 057A 002B A VPLUS: .WORD    '+'/256
1154 057B 002D A VMINUS: .WORD   '-'/256
1155 057C 0013 A V19:   .WORD    19
1156 057D 002E A VDOT:  .WORD    '.'/256
1157 057E 000F A V000F: .WORD    X'F

1158 057F          .PAGE
1159 057F          .LOCAL
1160 057F          ; INPUT R0 CHAR
1161 057F          ; OUTPUT R0 LCHAR
1162 057F          ; RTS+1 NOT FOUND
1163 057F          ; RTS +0 FOUND
1164 057F          ; PROCESS . IF PRESENT OR GOTO GETHEX
1165 057F F1FD A GETNUM: SKNE    R0,VDOT      ; '.'
1166 0580 2103 A      JMP      PCL
1167 0581 290E A      JSR      GETHEX
1168 0582 0200 A      RTS      0      ;FOUND
1169 0583 0201 A      RTS      1      ;NOT FOUND
1170 0584 8722 A PCL:   LD      R1,CL(R3)
1171 0585 2F09 A      JSR      @LRTEST(R3)
1172 0586 2101 A      JMP      $2      ;IN REGISTER
1173 0587 2103 A      JMP      $1      ;FOUND AND NOT IN REG
1174 0588          $2:
1175 0588 D504 A      SUB      R1,REGA01
1176 0589 8903 A      LD      R2,REGA01
1177 058A AB23 A      ST      R2,RWORD(R3)
1178 058B          ; IF DOT '.' IS 'R' THEN CL MUST BE
1179 058B          ; 0-19 TILL END OF EXPR. THEN ADD RWORD.
1180 058B 2F0C A $1:   JSR      @LINPUT(R3) ;UPDATE SCANNER
1181 058C 0200 A      RTS      0
1182 058D 03BA T REGA01: .WORD    REGA

1183 058E          .PAGE
1184 058E          ; INPUT R0 LCHAR
1185 058E          ; OUTPUT R1 RESULT
1186 058E          ; RTS 0 FOUND
1187 058E          ; RTS \ NOT FOUND
1188 058E          .LOCAL
1189 058E 058F T CCNT:  .=. +1
1190 058F 0590 T NUM:  .=. +1
1191 0590 4D00 A GETHEX: LI      R1,0
1192 0591 A5FD A      ST      R1,NUM
1193 0592 4DFF A      LI      R1,-1
1194 0593 A5FA A      ST      R1,CCNT
1195 0594 E114 A $1:   SKG      R0,V2F
1196 0595 2106 A      JMP      HEXEX      ;TEST A-F
1197 0596 E113 A      SKG      R0,V39
1198 0597 2109 A      JMP      P09      ;PROCESS 0-9
1199 0598          ; TEST FOR A-F
1200 0598 E115 A TAF:  SKG      R0,V40
1201 0599 2102 A      JMP      HEXEX      ;DONE
1202 059A E111 A      SKG      R0,V46
1203 059B 2104 A      JMP      PAF      ; A-F
1204 059C          ; TEST RESULT AND EXIT
1205 059C 85F2 A HEXEX: LD      R1,NUM
1206 059D 79F0 A      ISZ     CCNT
1207 059E 0200 A      RTS      0
1208 059F 0201 A      RTS      1      ;NUM FOUND
1209 05A0 4809 A PAF:  AISZ     R0,9      ; 41-46 > 4A > 4F
1210 05A1 61DC A P09:  AND      R0,V000F ;MASK OFF X'40'

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DEBUG

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1211 05A2 85EC A          LD          R1,NUM
1212 05A3 79EA A          ISZ          CCNT          ;=-1
1213 05A4 5D04 A          SHL          R1,4          ;MULT BY 16
1214 05A5 3100 A          RADD         R0,R1          ;ADD NEW
1215 05A6 A5E8 A          ST           R1,NUM
1216 05A7 2F0C A          JSR          @LINPUT(R3)
1217 05A8 21EB A          JMP          $1
1218 05A9 002F A V2F:     .WORD        X'2F
1219 05AA 0039 A V39:     .WORD        X'39
1220 05AB 0041 A V41:     .WORD        X'41
1221 05AC 0046 A V46:     .WORD        X'46
1222 05AD FFFF A VM1:     .WORD        -1
1223 05AE 0040 A V40:     .WORD        X'40

1224 05AF                      .PAGE
1225 05AF                      .LOCAL
1226 05AF                      ; PRINT THE ELEMENTS IN A SET OF RANGES.
1227 05AF                      ; INPUT R2 BASE RANGE
1228 05AF                      ; PTOP HAS TOP RANGE
1229 05AF                      PRANGE:
1230 05AF A90B A $1:       ST           R2,PBASE
1231 05B0 8200 A          LD           R0,(R2)          ;BASE LOC
1232 05B1 8601 A          LD           R1,1(R2)          ;TOP LOC
1233 05B2 2F11 A          JSR          @LOUTPUT(R3)      ;OUTPUT CONTINUE
1234 05B3 8907 A          LD           R2,PBASE
1235 05B4 8601 A          LD           R1,1(R2)
1236 05B5 A722 A          ST           R1,CL(R3)
1237 05B6                      ;UPDATE CL AFTER OUTPUT
1238 05B6                      ;IN CASE OF ESC
1239 05B6 4A02 A          AISZ         R2,2
1240 05B7 E902 A          SKG          R2,PTOP
1241 05B8 21F6 A          JMP          $1
1242 05B9 0200 A          RTS          0
1243 05BA 05BB T PTOP:     .=. +1          ;TOP RANGE TO PRINT
1244 05BB 05BC T PBASE:     .=. +1          ;BASE RANGE TO PRINT

1245 05BC                      .PAGE
1246 05BC                      ; FORMAT THE LOCATION IN R0 TO R1 AND OUTPUT
1247 05BC 05BD T I:         .=. +1
1248 05BD 05BE T BADDR:     .=. +1
1249 05BE 05BF T TADDR:     .=. +1
1250 05BF 05C0 T RCNT:      .=. +1
1251 05C0 0020 A IBLANK     =              ' '/256
1252 05C0                      ; R0 BOTTOM ADDRESS
1253 05C0                      ; R1 TOP ADDRESS
1254 05C0 A1FC A OUTPUT:    ST           R0,BADDR
1255 05C1 A5FC A          ST           R1,TADDR
1256 05C2 2F06 A NEWL:      JSR          @LPCRLF(R3)
1257 05C3 81F9 A          LD           R0,BADDR
1258 05C4 2935 A          JSR          PUTADR          ;R0 HAS ADR
1259 05C5 4C08 A          LI           R0,LENG          ;# OF COLUMNS
1260 05C6 A1F8 A          ST           R0,RCNT          ;REMAINING COLS
1261 05C7 91F5 A OLDL:     LD           R0,@BADDR          ;OUTPUT CONTENTS
1262 05C8 2F19 A          JSR          @LOUTW(R3)          ;OF LOCATION
1263 05C9 2F14 A          JSR          @LPUTBLK(R3)
1264 05CA                      ; DECREMENT REMAINING COL COUNT
1265 05CA 7DF4 A          DSZ          RCNT
1266 05CB 3081 A          NOP                      ; 0 REMAIN
1267 05CC 4D00 A          LI           R1,0
1268 05CD A5EE A          ST           R1,I
1269 05CE                      ; I IS INDEX TO COUNT # OF DUP LICATES
1270 05CE 89EE A          LD           R2,BADDR
1271 05CF 79EC A $5:       ISZ          I

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DEBUG

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1272 05D0 85EB A          LD      R1,I
1273 05D1 3900 A          RADD     R2,R1          ; R1=BADDR+I
1274 05D2 E5EB A          SKG      R1,TADDR
1275 05D3 2101 A          JMP      $2
1276 05D4 0200 A          RTS      0
1277 05D5          ; DONE - ALL REMAINING THE SAME
1278 05D5          ; TEST FOR DUPLICATE
1279 05D5 8200 A $2:      LD      R0,(R2)
1280 05D6 A51F A          ST       R1,OTEMP
1281 05D7 951E A          LD      R1,@OTEMP
1282 05D8 A51D A          ST       R1,OTEMP
1283 05D9 F11C A          SKNE     R0,OTEMP
1284 05DA 21F4 A          JMP      $5
1285 05DB          ; R0 HAS VALUE ALREADY PRINTED
1286 05DB          ;
1287 05DB          ; ALL DUP FOUND
1288 05DB          ; DO THEY EXCEED # LEFT ON LINE
1289 05DB          ;
1290 05DB          ;
1291 05DB 81E0 A          LD      R0,I
1292 05DC E1E2 A          SKG      R0,RCNT
1293 05DD 2116 A          JMP      DOONE          ;NEED TO PRINT ALL
1294 05DE          ;
1295 05DE          ; NEED TO DECIDE HOW MANY LINES TO
1296 05DE          ; SKIP BECAUSE OF DUP

1297 05DE          ;
1298 05DE 81DE A DUPFIL: LD      R0,BADDR
1299 05DF C1DF A          ADD      R0,RCNT          ; (MAY BE ZERO)
1300 05E0 4801 A          AISZ     R0,1
1301 05E1 A1DB A          ST       R0,BADDR
1302 05E2          ;
1303 05E2          ; THE NEXT ADDRESS WILL BE AT LEAST ON NEXT LINE
1304 05E2          ;
1305 05E2 89D9 A          LD      R2,I
1306 05E3 D9DB A          SUB      R2,RCNT
1307 05E4 A9D7 A          ST       R2,I
1308 05E5          ;
1309 05E5          ; BADDR MOVED UP SO I DECREMENTED
1310 05E5          ;
1311 05E5 89D6 A $8:      LD      R2,I
1312 05E6 D90C A          SUB      R2,VLENG
1313 05E7 A9D4 A          ST       R2,I
1314 05E8 4A00 A          AISZ     R2,0
1315 05E9 2101 A          JMP      $10
1316 05EA 21D7 A          JMP      NEWL
1317 05EB          $10:          ;I <= 0 JMP TO NEWL
1318 05EB 4C00 A          LI       R0,0
1319 05EC E1CF A          SKG      R0,I
1320 05ED 2101 A          JMP      INCBAD          ;INCREM BASE ADDR
1321 05EE 21D3 A          JMP      NEWL          ;BASE IS UPDATED
1322 05EF          ;          SO PRINT IT
1323 05EF 81CD A INCBAD: LD      R0,BADDR
1324 05F0 C102 A          ADD      R0,VLENG
1325 05F1 A1CB A          ST       R0,BADDR
1326 05F2 21F2 A          JMP      $8
1327 05F3 0008 A VLENG:  .WORD    LENG
1328 05F4 0008 A LENG    =      8          ;LINE LENGTH
1329 05F4          ;
1330 05F4          ; JUST PRINT ONE
1331 05F4          ;
1332 05F4 79C8 A DOONE:   ISZ      BADDR
1333 05F5 21D1 A          JMP      OLDL

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DEBUG

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1334 05F6 05F7 T OTEMP:  .=.+1
1335 05F7          ;
1336 05F7          ;
1337 05F7          ;
1338 05F7 4C20 A PUTBLK:  LI      R0,IBLANK
1339 05F8 2F07 A          JSR      @LPUTC(R3)
1340 05F9 0200 A          RTS

1341 05FA          .PAGE
1342 05FA          .LOCAL
1343 05FA          ;
1344 05FA A10D A PUTADR:  ST      R0,HAS LOC
1345 05FB 3181 A          RCPY    R0,ADRVAL
1346 05FC 2F09 A          JSR      R0,R1
1347 05FD 2104 A          JMP      @LRTEST(R3)
1348 05FE 2F15 A $2:      JSR      $1          ; YES 'R'
1349 05FF 2F14 A          JSR      @LPUT4H(R3)
1350 0600 2F14 A          JSR      @LPUTBLK(R3)
1351 0601 0200 A          RTS      @LPUTBLK(R3) ;PUT BLANKS
1352 0602          ; R VALUE
1353 0602 D106 A $1:      SUB      R0,REGA00    ;REGISTER
1354 0603 A104 A          ST      R0,ADRVAL    ;VALUE
1355 0604 4C52 A          LI      R0,IR
1356 0605 2F07 A          JSR      @LPUTC(R3)
1357 0606 8101 A          LD      R0,ADRVAL
1358 0607 21F6 A          JMP      $2
1359 0608 0609 T ADRVAL:  .=.+1
1360 0609 03BA T REGA00:  .WORD    REGA

1361 060A          .PAGE
1362 060A          .LOCAL
1363 060A 0008 A          STKFUL=8
1364 060A 0001 A          IEN=1
1365 060A 0009 A TSTIEN=9
1366 060A 000A A CYOV     =      10
1367 060A 000D A SELX     =      13
1368 060A 060B T $RET:    .=.+1
1369 060B 060C T $TEMP:   .=.+1
1370 060C 060D T IENST:   .=.+1
1371 060D 060E T SELST:   .=.+1
1372 060E          SAVER:SAVREG:
1373 060E 191E A          BOC      TSTIEN,$2
1374 060F B13F A          ST      R0,@REGA0
1375 0610 4CFF A          LI      R0,-1          ;SET RESTORE TO LEAVE CPU DISABLED
1376 0611 A1FA A $3:      ST      R0,IENST
1377 0612 1801 A          BOC      STKFUL,+.2
1378 0613 2101 A          JMP      .+2
1379 0614 0000 A          HALT          ;HALT ON STACK FULL
1380 0615 4400 A          PULL     R0          ;SAVE SAVEREG RETURN
1381 0616 A1F3 A          ST      R0,$RET
1382 0617 0080 A          PUSHF          ; SAVE STATUS FLAGS
1383 0618 4400 A          PULL     R0
1384 0619 B13A A          ST      R0,@REG20
1385 061A 4C01 A          LI      R0,1
1386 061B 58FE A          ROR      R0,2
1387 061C A1F0 A          ST      R0,SELST
1388 061D 4400 A          PULL     R0          ;SAVE ADDR OF DEBUG CALL
1389 061E 48FF A          AISZ     R0,-1
1390 061F A1EB A          ST      R0,$TEMP
1391 0620 B52F A          ST      R1,@REGA1
1392 0621 B92F A          ST      R2,@REGA2
1393 0622 BD2F A          ST      R3,@REGA3
1394 0623 4D0F A          LI      R1,STS2-1

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DEBUG

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1395 0624 892E A      LD      R2,REGA4
1396 0625 4400 A $1:   PULL    R0
1397 0626 A200 A      ST      R0,(R2)
1398 0627 4A01 A      AISZ    R2,1
1399 0628 49FF A      AISZ    R1,-1
1400 0629 21FB A      JMP     $1
1401 062A 81E0 A      LD      R0,$TEMP      ;GET DEBUG RETURN ADDRESS IN R0
1402 062B 8D05 A      LD      R3,$4
1403 062C 25DD A      JMP     @$RET
1404 062D 0980 A $2:   PFLG    IEN
1405 062E B120 A      ST      R0,@REGA0
1406 062F 4C00 A      LI      R0,0      ;SET RESTORE TO ENABLE CPU ON EXIT
1407 0630 21E0 A      JMP     $3
1408 0631 021C T $4:   .WORD    DBASE

1409 0632                .PAGE
1410 0632                .LOCAL
1411 0632 A11B A RESTOR: ST      R0,$RET      ;SAVE ADDRESS TO EXIT TO
1412 0633 4E10 A      LI      R2,STSZ
1413 0634 4400 A $1:   PULL    R0      ;CLEAR STACK
1414 0635 4AFF A      AISZ    R2,-1
1415 0636 21FD A      JMP     $1
1416 0637 4D10 A      LI      R1,STSZ
1417 0638 8919 A $2:   LD      R2,REGA3      :LIFO
1418 0639 3600 A      RADD    R1,R2
1419 063A 8200 A      LD      R0,(R2)
1420 063B 4000 A      PUSH    R0
1421 063C 49FF A      AISZ    R1,-1
1422 063D 21FA A      JMP     $2
1423 063E                ; RESTORE LINE REG
1424 063E 9115 A      LD      R0,@REG20      ; RESTORE FLAGS
1425 063F 4000 A      PUSH    R0
1426 0640 0280 A      PULLF
1427 0641 0A00 A      SFLG    2      ; SET SELX FLAG
1428 0642 81CA A      LD      R0,SELST
1429 0643 1B01 A      BOC     NEG,+.2
1430 0644 0A80 A      PFLG    2      ; CLEAR SELX FLAG
1431 0645 8108 A      LD      R0,$RET      ;INIT STACK FOR RTS/RTI
1432 0646 4000 A      PUSH    R0
1433 0647 9107 A      LD      R0,@REGA0
1434 0648 9507 A      LD      R1,@REGA1
1435 0649 9907 A      LD      R2,@REGA2
1436 064A 9D07 A      LD      R3,@REGA3
1437 064B 79C0 A      ISZ     IENST      ;RESTORE CPU ENABLE
1438 064C 0100 A      RTI      0
1439 064D 0200 A      RTS      0
1440 064E 064F T $RET:  .=. +1
1441 064F 03BA T REGA0: .WORD    REGA
1442 0650 03BB T REGA1: .WORD    REGA+1
1443 0651 03BC T REGA2: .WORD    REGA+2
1444 0652 03BD T REGA3: .WORD    REGA+3
1445 0653 03BE T REGA4: .WORD    REGA+4
1446 0654 03CE T REG20: .WORD    REGA+20
1447 0655 0250 T      .END    DEBUG
POINTERS GENERATED
0016 04AD T

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***** 0 ERRORS IN ASSEMBLY *****

DEBUG

\$0.	\$02	\$0;	\$1"	\$1%	\$1&	\$1'	\$1)	\$1*	\$1,
036F T	0432 T	050E T	026F T	02A9 T	02C1 T	02D6 T	02F6 T	030B T	0341 T
\$1.	\$1/	\$10	\$10=	\$10>	\$10A	\$11=	\$14	\$143	\$15
0378 T	038F T	03AE T	055F T	0573 T	05EB T	0563 T	04A2 T	0452 T	04BD T
\$17	\$18	\$19	\$1;	\$1<	\$1>	\$1?	\$1@	\$1A	\$1B
04E2 T	04EA T	04F6 T	0514 T	052E T	0574 T	058B T	0594 T	05AF T	0602 T
\$1C	\$1D	\$2"	\$2\$	\$2&	\$2)	\$2*	\$2.	\$2/	\$22
0625 T	0634 T	0274 T	0297 T	02B6 T	02FA T	030F T	0377 T	038E T	0438 T
\$24	\$26	\$29	\$2;	\$2=	\$2>	\$2?	\$2A	\$2B	\$2C
04A4 T	04D5 T	04FF T	051D T	054B T	0578 T	0588 T	05D5 T	05FE T	062D T
\$2D	\$32	\$36	\$3;	\$3C	\$4;	\$4=	\$4>	\$4C	\$52
0638 T	043A T	04D3 T	0510 T	0611 T	0511 T	0551 T	0570 T	0631 T	043D T
\$5=	\$5A	\$6-	\$62	\$6=	\$7-	\$72	\$8-	\$8A	\$9-
0557 T	05CF T	0354 T	043F T	055A T	0358 T	0441 T	0364 T	05E5 T	0361 T
\$CNT5	\$INIT"	\$M3	\$R3	\$RET(	\$RETC	\$RETD	\$TEMP5	\$TEMPC	ACHAR
04C9 T	025B T	0464 T	0487 T	02E4 T	060A T	064E T	04BA T	060B T	053F T
ADDR	ADHRUN	ADVAL	ADSRUN	AERADR	AEREX	AHRUNB	ALTER	APTOP	ASRUNB
0503 T	0011 B	0608 T	0010 B	0290 T	0291 T	0013 B	034B T	0004 A	0012 B
ASYN	BADDR	BLANK	BOFFSE	BS	BSCODE	CCNT	CEND	CFND	CHAR
0540 T	05BD T	041D T	0010 A	005F A	03A2 T	058E T	028F T	0273 T	03AD T
CL	CLCHAR	CLEAR	CODE	CODEB	CPAD	CR	CRCODE	CTAB	CTADR
0022 A	033D T	0296 T	0032 A	0033 A	025A T	000D A	03A6 T	0275 T	029C T
CURR	CYOV	DBASE	DEBUG	DEBUG1	DEBUG2	DELAY	DELAY1	DELTA	DIA
0535 T	000A A	021C T	0250 T	0210 T	0252 T	FFF5 A	FFF6 A	0026 A	0218 T
DOONE	DRBASA	DRBASE	DRMAX	DRPTR	DRSZ	DRTAB	DRTOP	DUPFIL	EA
05F4 T	021B T	0349 T	034A T	0348 T	000A A	0403 T	0382 T	05DE T	0009 A
EB	EC	ECHOA	ELOOP	ERR	ESC	ESCADR	ESCEX	EXPEX	EXPEXT
0016 A	0026 A	0423 T	0353 T	0294 T	0293 T	029B T	001E A	001F A	0556 T
EXPR	FIND	FMT	FVALU	GETC	GETHEX	GETNUM	GETSYN	GO	GOLOC
0538 T	0383 T	0025 A	0369 T	0422 T	0590 T	057F T	0566 T	033E T	0345 T
GPCS	GTEMP	H7F	HALT	HBASE	HBASEA	HBASEB	HCODE	HCODEB	HCONTU
0018 A	04A7 T	041F T	02B1 T	0029 A	0219 T	02B0 T	0030 A	0031 A	031B T
HENT	HEXEX	HFND	HMARK	HMAX	HOK	HPTR	HRBASA	HRBASE	HRET
0027 A	059C T	0302 T	0023 A	002A A	02C4 T	0028 A	021A T	002C A	031A T
HRMAX	HRPTR	HRSZ	HRTAB	HRUN	HRUNB	HSZ	HTAB	I	IBLANK
002D A	002B A	000A A	03EF T	02F1 T	0325 T	0008 A	03CF T	05BC T	0020 A
IEN	IENST	IMP16	INCBAD	INPUT	IR	JMPI	LADDR	LALPHA	LCHAR
0001 A	060C T	FFFF A	05EF T	0417 T	0052 A	0217 T	000F A	0013 A	0024 A
LECHOI	LECOA	LECOI	LENG	LEXPR	LF	LFCODE	LGETC	LHOK	LINPUT
0420 T	0001 A	0000 A	0008 A	000B A	000A A	03A5 T	0008 A	0016 A	000C A
LOUTCL	LOUTPU	LOUTW	LPCRLF	LPRANG	LPUT2C	LPUT4H	LPUTAD	LPUTBL	LPUTC
001C A	0011 A	0019 A	0006 A	0010 A	0005 A	0015 A	001A A	0014 A	0007 A
LRANGE	LRCHAR	LRD0	LRESTO	LRTEST	LTCRLF	LTECHO	LTTERM	LTTYT	LTYPA
0017 A	000D A	001B A	0012 A	0009 A	000A A	0444 T	0018 A	042F T	0003 A

LTYPEI	LTYPI	LVALUE	MINCOD	MINUS	MORER	MOVE	NEG	NEWL	NOTE
0494 T	0002 A	000E A	0572 T	0554 T	0507 T	036A T	000B A	05C2 T	039E T
NULL	NUM	OFFSET	OLDL	OP	OPADR	OPVEC	OTEMP	OUT	OUT4H
041E T	058F T	0001 A	05C7 T	0537 T	0549 T	0545 T	05F6 T	025F T	04BB T
OUTCL	OUTHEX	OUTPUT	OUTW	OVER	OVRADR	OVREX	P09	PAF	PBASE
0336 T	04BB T	05C0 T	04AF T	029E T	029D T	0020 A	05A1 T	05A0 T	05BB T
PCHAR	PCL	PCR	PCR1	PCRLF	PEROP	PHRET	PLF	PLFCR	PLSCOD
002D A	0584 T	04A8 T	04A9 T	04AC T	054E T	0336 T	04AD T	04AC T	0576 T
PQUOTE	PRANGE	PTECHO	PTOP	PTTYT	PUT2C	PUT4H	PUTADR	PUTBLK	PUTC
04F4 T	05AF T	0421 T	05BA T	0495 T	04B2 T	04BB T	05FA T	05F7 T	0496 T
QMARK	R0	R1	R2	R3	RANGE	RCHAR	RCNT	RD0	REG20
003F A	0000 A	0001 A	0002 A	0003 A	0505 T	052A T	05BF T	04CF T	0654 T
REGA	REGA0	REGA00	REGA01	REGA1	REGA2	REGA3	REGA4	REGADR	REGAM1
03BA T	064F T	0609 T	058D T	0650 T	0651 T	0652 T	0653 T	0534 T	04E5 T
REGEN	REPLAC	RESET	REST	RESTOR	RESULT	RMAX	RPTR	RR	RR1
04E6 T	02BD T	02A3 T	0476 T	0632 T	0536 T	0529 T	0021 A	0520 T	0525 T
RSTRIA	RTEST	RUNB	RWORD	SAVE	SAVER	SAVREG	SAVRIA	SCODE	SCODEB
0015 B	04DF T	032B T	0023 A	0465 T	060E T	060E T	0014 B	002E A	002F A
SELST	SELX	SFND	SNAP	SRREG	SRUN	SRUNB	STKFUL	STKSZ	STOROP
060D T	000D A	039B T	02D1 T	0487 T	0306 T	0328 T	0008 A	0010 A	054A T
STSTR	STSZ	TA	TADDR	TAF	TB	TC	TCRLF	TOFFSE	TSTIEN
04FA T	0010 A	0029 A	05BE T	0598 T	0012 A	0070 A	04D9 T	0210 A	0009 A
TTERM	TTYAD	TYPE	TYPEA	UCALL	V000F	V19	V2F	V39	V40
04E7 T	0038 A	03AB T	0499 T	02E5 T	057E T	057C T	05A9 T	05AA T	05AE T
V41	V46	V9	VALUE	VAM10	VC09	VCOLON	VCOM	VCOMM	VCOMMA
05AB T	05AC T	04CC T	04EF T	04CB T	04CA T	0532 T	001D A	0367 T	0533 T
VCR	VCR0	VDOT	VECTOR	VESC	VF	VFF	VFF00	VLENG	VLF
0492 T	0368 T	057D T	0543 T	0491 T	04CD T	04CE T	0502 T	05F3 T	0493 T
VM1	VMINUS	VOV	VPLUS	VQU	VR				
05AD T	057B T	02A2 T	057A T	0501 T	0531 T				

E196 4DC9

TTY16P

TTY16P

REVISION-G 05/16/74
TTY16P 00312D 10/15/74

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1 0000      .TITLE  TTY16P,'00312D  10/15/74'
2 0000      .ASECT
3 0000      ;
4 0000      ; TTY16P CONTAINS THE IMP-16P TELETYPE AND
5 0000      ; HIGH-SPEED PAPER TAPE READER I/O DRIVERS.
6 0000      ;
7 0000      ; THERE IS ONE MAIN PROGRAM:
8 0000      ;
9 0000      ;     ABSTTY - ABSOLUTE PAPER TAPE LM LOADER
10 0000     ;
11 0000     ; SUBROUTINES ARE:
12 0000     ;
13 0000     ;     PUTC  - TRANSMITS A CHARACTER FROM BITS 0-7 OF
14 0000     ;     ACCUMULATOR 0 (AC0) TO THE TELETYPE
15 0000     ;     GETC  - RECEIVES A CHARACTER FROM EITHER THE HIGH SPEED
16 0000     ;     PAPER TAPE READER (IF ENABLED) OR
17 0000     ;     TELETYPE, FOR TRANSFER TO BITS 0-7 OF AC0
18 0000     ;     GECO  - RECEIVES A CHARACTER FROM THE TELETYPE
19 0000     ;     AND ECHOES IT ON THE TELETYPE PRINTER
20 0000     ;     MESG  - PRINTS A SERIES OF ASCII CHARACTERS ON THE TELETYPE
21 0000     ;     PUT2C - PRINTS TWO CHARACTERS IN AC0 ON THE TELETYPE
22 0000     ;     RESET - RESETS THE TELETYPE
23 0000     ;     INTEST - TESTS FOR TELETYPE INPUT
24 0000     ;     LDM   - LOAD MULTIPLE - LOAD REGISTERS FROM MEMORY
25 0000     ;     STM   - STORE MULTIPLE - SAVE REGISTERS IN MEMORY
26 0000     ;
27 0000     ;     DPLX IS NOT INCLUDED IN THIS REVISION
28 0000     ;
29 0000     ; SUBROUTINE LIMITATIONS AND CONVENTIONS:
30 0000     ;
31 0000     ;     ALL REGISTERS ARE SAVED IN ALL SUBROUTINES, EXCEPT THAT
32 0000     ;     REGISTER AC0 HAS THE CHARACTER RECEIVED (GETC,GECO).
33 0000     ;
34 0000     ;     THE STACK IS PUSHED UP TO FIVE LEVELS DEEP
35 0000     ;     DURING EXECUTION OF THESE ROUTINES.
36 0000     ;
37 0000     ;     RALU FLAGS ARE NOT SAVED; SELECT FLAG IS CLEARED.
38 0000     ;
39 0000     ;     INTEST - RETURN FROM SUBROUTINE IS AS FOLLOWS:
40 0000     ;     RTS 0 - ATTEMPT TO INPUT FROM TELETYPE
41 0000     ;     RTS 1 - NO INPUT FROM TELETYPE KEYBOARD
42 0000     ;
43 0000     ;
44 0000     ; ENTRY POINTS:
45 0000     ;
46 0000     ;     ABSTTY - 7E00      MESG  - 7EC3
47 0000     ;     GETC  - 7E3B      RESET - 7EDA
48 0000     ;     PUTC  - 7E59      INTEST - 7EDF
49 0000     ;     GECO  - 7E73      LDM   - 7EEA
50 0000     ;     PUT2C - 7ED3      STM   - 7EF2

51 0000     .PAGE
52 0000     ;
53 0000     ; DEFINITIONS
54 0000     ;
55 0000 0000 A AC0    =      0
56 0000 0001 A AC1    =      1
57 0000 0002 A AC2    =      2
58 0000 0003 A AC3    =      3
59 0000     ;
60 0000 0001 A ZRO     =      1      ; AC0 = 0
61 0000 0002 A POS     =      2      ; AC0 >= 0

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62 0000 0005 A NZRO      =      5
63 0000      ;
64 0000 0038 A TTYAD      =      7*8      ; TELETYPE ADDRESS
65 0000 0002 A READ       =      2      ; READ TTY COMMAND CODE
66 0000 0003 A SEND       =      3      ; SEND TO TTY COMMAND CODE
67 0000 0004 A RDREN      =      4      ; READER ENABLE
68 0000 0005 A RESET      =      5      ; RESET TTY
69 0000 0006 A INT        =      6      ; INTERRUPT STATUS
70 0000      ;
71 0000 0010 A PRADR      =      2*8      ; PAPER TAPE READER ADDRESS
72 0000 0001 A PREAD      =      1      ; PAPER TAPE READER EXPRESSIONS
73 0000 0002 A PSTART     =      2
74 0000 0003 A PRESET     =      3
75 0000      ;
76 0000 7E00 A      . = 07E00      ; ENTRY POINT
77 7E00      ;
78 7E00      ;
79 7E00      ; *****
80 7E00      ; *
81 7E00      ; *      THIS PROGRAM FITS INTO 2 8X256-BIT PROMS ON THE
82 7E00      ; *      CARD READER/TELETYPE INTERFACE CARD:
83 7E00      ; *
84 7E00      ; *      IMP      PROM      ROM      BOARD
85 7E00      ; *      NUMBER      NUMBER      NUMBER      CO-ORDINATE
86 7E00      ; *
87 7E00      ; *      IMP-16F/003A      4600312D      4100312D      5G
88 7E00      ; *      IMP-16F/003B      4610312D      4110312D      7G
89 7E00      ; *
90 7E00      ; *****

91 7E00      .PAGE      'ABSTTY FOR THE IMP-16P'
92 7E00      ;
93 7E00      ;      LOADS LM FROM 8 CHANNEL PAPER TAPE.
94 7E00      ;
95 7E00      ;      TO LOAD TAPES:
96 7E00      ;
97 7E00      ;      1) TURN ON READER
98 7E00      ;      2) PRESS 'INITIALIZE' SWITCH ON THE IMP-16P
99 7E00      ;      3) PUT PAPER TAPE IN THE TAPE READER
100 7E00      ;      (HIGH SPEED READER IF AVAILABLE, OR TTY READER)
101 7E00      ;      4) PRESS 'LOAD PROGRAM' SWITCH ON THE IMP-16P
102 7E00      ;
103 7E00      ;      IF THE LOADER HALTS WITH THE PC SET TO 7E23 ,
104 7E00      ;      A CHECKSUM ERROR HAS OCCURRED. CHECK THE TAPE AND
105 7E00      ;      PRESS 'RUN' WHEN IT IS READY TO READ AGAIN.
106 7E00      ;      (TO IGNORE THE ERROR, JUST PRESS 'RUN').
107 7E00      ;
108 7E00      ;      IF THE LOADER HALTS WITH THE PC SET TO 7E31 ,
109 7E00      ;      THE TAPE IS FINISHED (THE END RECORD HAS BEEN READ).
110 7E00      ;      A) TO LOAD ANOTHER TAPE, GO BACK TO STEP 3.
111 7E00      ;      B) TO START EXECUTION, PRESS 'RUN'.
112 7E00      ;      C) TO START EXECUTION AT A NEW ENTRY POINT,
113 7E00      ;      SET EITHER AC2 OR THE PC TO THE NEW
114 7E00      ;      ENTRY POINT, THEN PRESS 'RUN'.
115 7E00      ;
116 7E00      ;
117 7E00 293A A ABSTTY: JSR      GETC
118 7E01 48FE A      AISZ      AC0,-2      ; LOOK FOR STX (START OF TEXT)
119 7E02 21FD A      JMP      ABSTTY
120 7E03 292E A TTY1: JSR      RDWD      ; PROCESS RECORD CONTROL INFORMATION
121 7E04 121F A      BOC      POS,TORS      ; BRANCH IF TITLE OR SYMBOL RECORD
122 7E05 5C01 A      SHL      AC0,1
123 7E06 1201 A      BOC      POS,+.2      ; BRANCH TO DATA RECORD,
124 7E07 2123 A      JMP      ENDREC      ; ELSE GO TO END RECORD
125 7E08 5CFF A      SHR      AC0,1
126 7E09 3381 A      RCPY      AC0,AC3      ; RECORD BODY LENGTH IN AC3

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127 7E0A 2927 A      JSR      RDWD
128 7E0B 3181 A      RCPY      AC0,AC1      ; SAVE CHECKSUM
129 7E0C 4000 A      PUSH      AC0
130 7E0D 5101 A      CAI        AC1,1      ; AC1 HAS -(CKSUM MODE WORD)
131 7E0E 290D A      JSR      RDWDCK      ; SKIP ADDRESS MODE
132 7E0F 290C A      JSR      RDWDCK      ; GET LOAD ADDRESS
133 7E10 3291 A      RCPY      AC0,AC2      ; LOAD ADDRESS IN AC2
134 7E11 290A A      JSR      RDWDCK      ; SKIP RELOCATION MODE WORDS
135 7E12 2909 A      JSR      RDWDCK
136 7E13 3B00 A      RADD      AC2,AC3
137 7E14 5305 A      CAI        AC3,1+4      ; AC3 HAS -(LAST ADDRESS - 1)
138 7E15 2906 A TTY2: JSR      RDWDCK      ; GET DATA WORD
139 7E16 A200 A      ST         AC0,(AC2)
140 7E17 4A01 A      AISZ      AC2,1      ; INCREMENT DESTINATION ADDRESS
141 7E18 3891 A      RCPY      AC2,AC0
142 7E19 3C00 A      RADD      AC3,AC0
143 7E1A 1204 A      BOC        POS,TCKSUM      ; IF DONE TEST CHECKSUM
144 7E1B 21F9 A      JMP        TTY2
145 7E1C      ;
146 7E1C 2915 A RDWDCK: JSR      RDWD      ; READ WORD AND ADD IT
147 7E1D 3100 A      RADD      AC0,AC1      ; TO THE CHECKSUM
148 7E1E 0200 A      RTS        0
149 7E1F      ;
150 7E1F 4400 A TCKSUM: PULL      AC0      ; GET CHECKSUM WORD
151 7E20 11DF A      BOC        ZRO,ABSTTY
152 7E21 4900 A      AISZ      AC1,0
153 7E22 0000 A      HALT      ; CHECKSUM ERROR
154 7E23 21DC A      JMP        ABSTTY
155 7E24      ;
156 7E24 6175 A TORS:  AND      AC0,H3FFF      ; IGNORE TITLE AND SYMBOL RECORDS
157 7E25 3181 A      RCPY      AC0,AC1
158 7E26 290B A      JSR      RDWD
159 7E27 49FF A      AISZ      AC1,-1
160 7E28 21FD A      JMP        .-2
161 7E29 2908 A      JSR      RDWD
162 7E2A 21D5 A      JMP        ABSTTY
163 7E2B      ;
164 7E2B      ;
165 7E2B 2906 A ENDREC: JSR      RDWD      ; SKIP CHECKSUM
166 7E2C 2905 A      JSR      RDWD      ; SKIP ENTRY ADDRESS MODE
167 7E2D 2904 A      JSR      RDWD      ; GET ENTRY ADDRESS
168 7E2E 3281 A      RCPY      AC0,AC2      ; COPY ENTRY ADDRESS INTO AC2
169 7E2F 4F00 A      LI        AC3,0      ; LOAD DEVICE IS TTY
170 7E30 0000 A      HALT      ; (PRESS RUN TO EXECUTE)
171 7E31 2200 A      JMP        (AC2)      ; JUMP TO LOADED PROGRAM
172 7E32      ;
173 7E32      ;
174 7E32 4100 A RDWD:  PUSH      AC1      ; READ A 16-BIT WORD INTO AC0
175 7E33 2907 A      JSR      GETC      ; OTHER REGISTERS ARE UNDISTURBED
176 7E34 5C08 A      SHL        AC0,8
177 7E35 4000 A      PUSH      AC0
178 7E36 2904 A      JSR      GETC
179 7E37 4500 A      PULL      AC1
180 7E38 3482 A      RXOR      AC1,AC0
181 7E39 4500 A      PULL      AC1
182 7E3A 0200 A      RTS        0

183 7E3B      .PAGE      'GETC AND PUTC ROUTINES'
184 7E3B      ;
185 7E3B      ;      READ TELETYPE CHARACTER INTO AC0
186 7E3B      ;
187 7E3B      ;      NOTE: GETC READS FROM THE HIGH SPEED PAPER TAPE READER

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183 7E3B      ;      IF IT IS CONNECTED AND TURNED ON; OTHERWISE INPUT IS FROM
189 7E3B      ;      THE TELETYPE READER.  IF A CARD READER IS CONNECTED
190 7E3B      ;      INSTEAD OF THE HIGH SPEED TAPE READER, IT MUST BE TURNED OFF
191 7E3B      ;      WHEN NOT IN USE.
192 7E3B      ;
193 7E3B 2160 A GETC:  JMP      RDRIN          ; TRY HIGH-SPEED READER FIRST
194 7E3C 297F A LP1:  JSR      DELAY          ; DELAY ONE BIT TIME
195 7E3D 0402 A      RIN      READ
196 7E3E 615A A      AND      AC0,MASK        ; MASK UNWANTED BITS
197 7E3F 5DFF A      SHR      AC1,1          ; SHIFT DATA
198 7E40 3182 A      RXOR     AC0,AC1        ; ADD NEW BIT TO DATA
199 7E41 4AFF A      AISZ     AC2,-1         ; TEST TO SEE IF DONE
200 7E42 21F9 A      JMP      LP1
201 7E43 2148 A      JMP      RETURN-4
202 7E44      ;
203 7E44 7E59 A      . = 07E59
204 7E59      ;
205 7E59      ;
206 7E59      ;      SEND CHARACTER IN AC0 TO TELETYPE
207 7E59      ;
208 7E59 293A A PUTC:  JSR      SAV            ; SAVE REGISTERS
209 7E5A 4000 A      PUSH     AC0            ; ALSO SAVE CHARACTER
210 7E5B 3181 A      RCPY     AC0,AC1
211 7E5C 4C0C A      LI       AC0,12
212 7E5D 295F A      JSR      DELAY+1
213 7E5E 4E09 A      LI       AC2,9          ; SET COUNT TO 9
214 7E5F 4F38 A      LI       AC3,TTYAD
215 7E60 0603 A      ROUT     SEND          ; SEND START BIT
216 7E61 295A A LP2:  JSR      DELAY          ; DELAY 1 BIT TIME
217 7E62 4AFF A      AISZ     AC2,-1         ; DECREMENT BIT COUNT
218 7E63 2101 A      JMP      .+2
219 7E64 2104 A      JMP      DONE
220 7E65 59FF A      ROR      AC1,1          ; SEND NEXT BIT
221 7E66 3481 A      RCPY     AC1,AC0
222 7E67 0603 A      ROUT     SEND
223 7E68 21F8 A      JMP      LP2
224 7E69 4CFF A DONE:  LI       AC0,-1        ; SEND STOP BIT
225 7E6A 0603 A      ROUT     SEND
226 7E6B 2950 A      JSR      DELAY
227 7E6C 4400 A      PULL     AC0            ; RESTORE AC0
228 7E6D 2121 A      JMP      RETURN-1       ; RESET, RESTORE REGISTERS, RETURN
229 7E6E      ;
230 7E6E 7E73 A      . = 07E73

231 7E73      .PAGE  'TELETYPE GET CHARACTER ROUTINE WITH ECHO'
232 7E73      ;
233 7E73      ;      READ TELETYPE CHARACTER INTO AC0 (WITH ECHO)
234 7E73      ;
235 7E73 2920 A GECO:  JSR      SAV            ; SAVE REGISTERS
236 7E74 4F38 A      LI       AC3,TTYAD
237 7E75 0605 A      ROUT     RESET          ; RESET TELETYPE
238 7E76 4E08 A      LI       AC2,8          ; SET BIT COUNT TO 8
239 7E77 0604 A      ROUT     RDREN         ; ENABLE READER
240 7E78 0402 A      RIN      READ
241 7E79 1201 A      BOC      POS,.,+2       ; TEST FOR START BIT
242 7E7A 21FD A      JMP      .-2
243 7E7B 4C09 A      LI       AC0,9
244 7E7C 2940 A      JSR      DELAY+1         ; DELAY 1/2 BIT TIME
245 7E7D 0402 A      RIN      READ          ; TEST IF START BIT IS STILL THERE
246 7E7E 1201 A      BOC      POS,.,+2       ; BRANCH IF GOOD START BIT
247 7E7F 21F5 A      JMP      GECO+2
248 7E80 0603 A LP3:  ROUT     SEND          ; ECHO BIT
249 7E81 293A A      JSR      DELAY          ; DELAY ONE BIT TIME
250 7E82 0402 A      RIN      READ
251 7E83 6115 A      AND      AC0,MASK        ; MASK UNWANTED BITS
252 7E84 5DFF A      SHR      AC1,1          ; SHIFT DATA

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253 7E85 3182 A      RXOR    AC0,AC1      ; ADD NEW BIT TO DATA
254 7E86 4AFF A      AISZ    AC2,-1      ; TEST TO SEE IF DONE
255 7E87 21F8 A      JMP     LP3
256 7E88 0603 A      ROUT    SEND        ; ECHO LAST BIT
257 7E89 2932 A      JSR     DELAY       ; DELAY INTO FIRST STOP BIT
258 7E8A 4CFF A      LI      AC0,-1
259 7E8B 0603 A      ROUT    SEND        ; SEND STOP BIT
260 7E8C 292F A      JSR     DELAY
261 7E8D 5DF8 A      SHR     AC1,8        ; SHIFT DATA INTO RIGHT 8 BITS
262 7E8E 3481 A      RCPY    AC1,AC0     ; COPY CHARACTER INTO AC0
263 7E8F 0605 A      ROUT    RESET
264 7E90 4600 A      RETURN: PULL    AC2      ; RESTORE REGISTERS
265 7E91 4500 A      PULL    AC1
266 7E92 4700 A      PULL    AC3
267 7E93 0200 A      RTS      0
268 7E94          ;
269 7E94          ;
270 7E94 5700 A      SAV:    XCHRS   AC3      ; SAVE REGISTERS IN STACK
271 7E95 4100 A      PUSH    AC1
272 7E96 4200 A      PUSH    AC2
273 7E97 0A80 A      PFLG    2            ; CLEAR SELECT FLAG
274 7E98 2300 A      JMP     (AC3)
275 7E99          ;
276 7E99 8000 A      MASK:    .WORD   08000
277 7E9A 3FFF A      H3FFF:    .WORD   03FFF
278 7E9B 7E9C A      .=. +1
279 7E9C          ;

280 7E9C          .PAGE    'PAPER TAPE READER AND TELETYPE ROUTINE'
281 7E9C          ;
282 7E9C 29F7 A      RDRIN:   JSR     SAV      ; SAVE REGISTERS
283 7E9D 4F10 A      LI      AC3,PRADR    ; CHECK WHETHER HIGH SPEED TAPE READER
284 7E9E 0401 A      RIN     PREAD        ; IS ON-LINE
285 7E9F 6119 A      AND     AC0,BIT12
286 7EA0 110C A      BOC     ZRO,$2
287 7EA1 4F38 A      S1:     LI      AC3,TTYAD ; NO HIGH-SPEED READER - USE TTY READER
288 7EA2 4E08 A      GETC2:   LI      AC2,8  ; SET BIT COUNT TO 8
289 7EA3 0605 A      ROUT    RESET        ; RESET TELETYPE
290 7EA4 0604 A      ROUT    RDREN       ; ENABLE READER
291 7EA5 0402 A      RIN     READ
292 7EA6 1201 A      BOC     POS,.,+2      ; TEST FOR START BIT
293 7EA7 21F5 A      JMP     RDRIN+1
294 7EA8 4C09 A      LI      AC0,9
295 7EA9 2913 A      JSR     DELAY+1      ; DELAY FOR 1/2 BIT TIME
296 7EAA 0402 A      RIN     READ        ; TEST IF START BIT IS STILL THERE
297 7EAB 1290 A      BOC     POS,LP1      ; BRANCH IF GOOD START BIT
298 7EAC 21F6 A      JMP     GETC2+1      ; NOISE - TRY AGAIN
299 7EAD          ;
300 7EAD 0401 A      S2:     RIN     PREAD        ; READ CHARACTER FROM HIGH SPEED TAPE R
301 7EAE 6103 A      AND     AC0,BIT13
302 7EAF 15F1 A      BOC     NZRO,$1      ; NOT THERE - USE TTY
303 7EB0 0602 A      ROUT    PSTART
304 7EB1 0603 A      ROUT    PRESET
305 7EB2 0401 A      RIN     PREAD
306 7EB3 6106 A      AND     AC0,BIT13    ; CHECK STATUS
307 7EB4 15FD A      BOC     NZRO,.-2     ; NO GOOD - KEEP TRYING
308 7EB5 0401 A      RIN     PREAD        ; REREAD CHARACTER
309 7EB6 5CFC A      SHR     AC0,4
310 7EB7 6103 A      AND     AC0,RTBYT    ; RETURN ONLY EIGHT BITS
311 7EB8 21D7 A      JMP     RETURN
312 7EB9          ;
313 7EB9 1000 A      BIT12:   .WORD   01000
314 7EBA 2000 A      BIT13:   .WORD   02000
315 7EBB 00FF A      RTBYT:   .WORD   0FF
316 7EBC          ;
317 7EBC 4C12 A      DELAY:   LI      AC0,18 ; DELAY SUBROUTINE (AC0)

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318 7EBD 5870 A      ROL      AC0,112          ; GOOD ONLY AT STANDARD SYSTEM SPEED
319 7EBE 48FF A      AISZ     AC0,-1
320 7EBF 21FD A      JMP      .-2
321 7EC0 5CD8 A      SHR      AC0,40
322 7EC1 0200 A      RTS      0
323 7EC2              ;
324 7EC2 7EC3 A      . = 07EC3

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325 7EC3              .PAGE   'MESSAGE PRINTING ROUTINE'
326 7EC3              ;
327 7EC3              ; MESSAGE PRINTING SUBROUTINE
328 7EC3              ;
329 7EC3              ;
330 7EC3              ; JSR      MSG          JUMP TO SUBROUTINE
331 7EC3              ; .WORD    MSG          MESSAGE ADDRESS
332 7EC3              ; .
333 7EC3              ; .
334 7EC3              ; MSG:  .ASCII 'MESSAGE.....'
335 7EC3              ; .WORD    0          MESSAGE TERMINATION
336 7EC3              ;
337 7EC3              ;
338 7EC3              ; NOTE: CARRIAGE RETURN AND LINE FEED PRECEDE THE MESSAGE.
339 7EC3              ;
340 7EC3              ; TO ABORT PRINTOUT, HIT THE BREAK KEY.
341 7EC3              ;
342 7EC3              ;
343 7EC3 5700 A MSG:   XCHRS    AC3          ; GET RETURN ADDRESS
344 7EC4 4300 A      PUSH     AC3
345 7EC5 4000 A      PUSH     AC0          ; REGISTERS ARE SAVED
346 7EC6 8F00 A      LD       AC3,(AC3)    ; GET MESSAGE ADDRESS
347 7EC7 8111 A      LD       AC0,CRLF     ; CR/LF FIRST
348 7EC8 290A A L1:   JSR      PUT2C
349 7EC9 8300 A      LD       AC0,(AC3)
350 7ECA 1104 A      BOC      ZRO,MSGEND    ; CHECK IF DONE YET
351 7ECB 2913 A      JSR      INTST        ; TEST FOR INTERRUPT
352 7ECC 2102 A      JMP      MSGEND
353 7ECD 4B01 A      AISZ     AC3,1
354 7ECE 21F9 A      JMP      L1
355 7ECF 4400 A MSGEND: PULL     AC0          ; RESTORE REGISTERS
356 7ED0 4700 A      PULL     AC3
357 7ED1 5700 A      XCHRS    AC3
358 7ED2 0201 A      RTS      1          ; RETURN (SKIP OVER PARAMETER)
359 7ED3              ;
360 7ED3              ; PUT2C - SEND 2 CHARACTERS TO TELETYPE
361 7ED3              ; (LEFT AND RIGHT BYTES OF AC0)
362 7ED3              ;
363 7ED3 0A80 A PUT2C: PFLG     2
364 7ED4 58F8 A      ROR      AC0,8
365 7ED5 2983 A      JSR      PUTC          ; SEND LEFT CHARACTER
366 7ED6 58F8 A      ROR      AC0,8
367 7ED7 2981 A      JSR      PUTC          ; SEND RIGHT CHARACTER
368 7ED8 0200 A      RTS      0
369 7ED9              ;
370 7ED9 0D0A A CRLF:  .WORD    0D0A          ; CARRIAGE RETURN AND LINE FEED

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371 7EDA              .PAGE   'TELETYPE RESET AND INPUT TEST'
372 7EDA              ;
373 7EDA              ; TELETYPE RESET
374 7EDA              ;
375 7EDA 4300 A TRESET: PUSH     AC3
376 7EDB 4F38 A      LI       AC3,TTYAD
377 7EDC 0605 A      ROUT     RESET
378 7EDD 4700 A RTN:   PULL     AC3

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379 7EDE 0200 A      RTS      0
380 7EDF              ;
381 7EDF              ;
382 7EDF              ;      TELETYPE INPUT TEST
383 7EDF              ;
384 7EDF              ;      RTS 0 - INTERRUPT
385 7EDF              ;      RTS 1 - NORMAL RETURN
386 7EDF              ;
387 7EDF 4300 A INTEST: PUSH      AC3
388 7EE0 4000 A      PUSH      AC0
389 7EE1 4F00 A      LI        AC3,0          ; ZERO ADDRESS TO READ STATUS
390 7EE2 0406 A      RIN        INT          ; READ INTERRUPT STATUS
391 7EE3 5C08 A      SHL        AC0,8        ; TTY STATUS IS BIT 7
392 7EE4 1202 A      BOC        POS,NINT     ; TEST FOR INTERRUPT
393 7EE5 4400 A      PULL      AC0
394 7EE6 21F6 A      JMP        RTN          ; RETURN
395 7EE7 4400 A NINT:  PULL      AC0          ; NO INTERRUPT
396 7EE8 4700 A      PULL      AC3
397 7EE9 0201 A      RTS        1

398 7EEA              .PAGE    'LOAD/STORE MULTIPLE SUBROUTINES'
399 7EEA              ;
400 7EEA              ;      LOAD MULTIPLE SUBROUTINE - LOAD REGISTERS FROM MEMORY
401 7EEA              ;
402 7EEA              ;      JSR      LDM          JUMP TO SUBROUTINE
403 7EEA              ;      .WORD    X          START OF SAVE AREA
404 7EEA              ;      (RETURN HERE)
405 7EEA              ;
406 7EEA              ;
407 7EEA 4700 A LDM:   PULL      AC3          ; GET STORAGE LOCATION
408 7EEB 4300 A      PUSH      AC3
409 7EEC 8F00 A      LD        AC3,(AC3)
410 7EED 8300 A      LD        AC0,0(AC3)      ; LOAD REGISTERS
411 7EEE 8701 A      LD        AC1,1(AC3)
412 7EEF 8B02 A      LD        AC2,2(AC3)
413 7EF0 8F03 A      LD        AC3,3(AC3)
414 7EF1 0201 A      RTS        1
415 7EF2              ;
416 7EF2              ;
417 7EF2              ;      STORE MULTIPLE SUBROUTINE - STORE REGISTERS IN MEMORY
418 7EF2              ;
419 7EF2              ;      JSR      STM          JUMP TO SUBROUTINE
420 7EF2              ;      .WORD    X          START OF SAVE AREA
421 7EF2              ;      (RETURN HERE)
422 7EF2              ;
423 7EF2              ;      REGISTERS ARE UNALTERED
424 7EF2              ;
425 7EF2 5700 A STM:   XCHRS     AC3          ; GET BUFFER ADDRESS
426 7EF3 4300 A      PUSH      AC3
427 7EF4 8F00 A      LD        AC3,(AC3)
428 7EF5 A300 A      ST        AC0,0(AC3)      ; STORE REGISTERS
429 7EF6 A701 A      ST        AC1,1(AC3)
430 7EF7 AB02 A      ST        AC2,2(AC3)
431 7EF8 4400 A      PULL      AC0
432 7EF9 5400 A      XCHRS     AC0
433 7EFA A303 A      ST        AC0,3(AC3)      ; STORE ORIGINAL AC3
434 7EFB 3300 A      LD        AC0,0(AC3)      ; RESTORE AC0
435 7EFC 8F03 A      LD        AC3,3(AC3)      ; RESTORE AC3
436 7EFD 0201 A      RTS        1
437 7EFE              ;
438 7EFE 7E00 A      .END      ABSTTY

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***** 0 ERRORS IN ASSEMBLY *****

TTY16P

\$1!	\$2!	ABSTTY	AC0	AC1	AC2	AC3	BIT12	BIT13	CRLF
7EA1 A	7EAD A	7E00 A	0000 A	0001 A	0002 A	0003 A	7EB9 A	7EBA A	7ED9 A
DELAY	DONE	ENDREC	GECO	GETC	GETC2	H3FFF	INT	INTEST	L1
7EBC A	7E69 A	7E2B A	7E73 A	7E3B A	7EA2 A	7E9A A	0006 A	7EDF A	7EC8 A
LDM	LP1	LP2	LP3	MASK	MESG	MSGEND	NINT	NZRO	POS
7EEA A	7E3C A	7E61 A	7E80 A	7E99 A	7EC3 A	7ECF A	7EE7 A	0005 A	0002 A
PRADR	PREAD	PRESET	PSTART	PUT2C	PUTC	RDREN	RDRIN	RDWD	RDWDCK
0010 A	0001 A	0003 A	0002 A	7ED3 A	7E59 A	0004 A	7E9C A	7E32 A	7E1C A
READ	RESET	RETURN	RTBYT	RTN	SAV	SEND	STM	TCKSUM	TORS
0002 A	0005 A	7E90 A	7EBB A	7EDD A	7E94 A	0003 A	7EF2 A	7E1F A	7E24 A
TRESET	TTY1	TTY2	TTYAD	ZRO					
7EDA A	7E03 A	7E15 A	0038 A	0001 A					

2250 9992

GENLDR

GENLDR

REVISION-G 01/02/74
GENLDR 00123D 01/01/74

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1 0000 0001 A GENL      =      1      ; ASSEMBLE GENLDR
2 0000 0000 A DSKL      =      0
3 0000 0001 A IMP16L    =      1      ; ASSEMBLE FOR IMP-16L
4 0000                      .IF      IMP16L
5 0000                      .IF      GENL
6 0000                      .TITLE   GENLDR,'00123D  01/01/74'
7 0000                      .ENDIF
8 0000                      .TSECT
9 0000                      .IF      1-DSKL
10 0000 0880 T          .=.+X*880
11 0880                      .LOCAL
12 0880                      ;
13 0880                      ; SAVE INPUT DEVICE FLAG
14 0880                      ;
15 0880 AC12 B DSCLDR: ST      R3,INDEVF      ;0=TTY, 1=CARD READER
16 0881                      .IF      IMP16L
17 0881                      ;
18 0881                      ; INITIALIZE LOADER FOR 16P/16L
19 0881                      ;
20 0881 8D2D A SETPL:  LD      R3,CPAD
21 0882 0418 A          RIN      GPCS
22 0883 4801 A          AISZ     R0,1
23 0884 2C4C I          JSR      LINIT
24 0885                      .ENDIF
25 0885                      ;
26 0885                      ; WRITE LOADER READY MESSAGE
27 0885                      ;
28 0885 8443 B          LD      R1,HOD0A;
29 0886 2C4D I          JSR      OUTWD;
30 0887 9C4E I          LD      R3,TBL4
31 0888 4E1D A          LI      R2,29
32 0889 2C4F I          JSR      OUTANS
33 088A                      .IF      GENL      ;. . . . .
34 088A                      ;
35 088A                      ; INITIALIZE LOADER STATE
36 088A                      ;
37 088A 7817 B          ISZ      STATE
38 088B                      .ENDIF      ;. . . . .
39 088B                      ;
40 088B                      ; READ COMMAND FROM INPUT DEVICE SPECIFIED
41 088B                      ;
42 088B 8012 B READCM: LD      R0,INDEVF
43 088C 1102 A          BOC      ZRO,+.3
44 088D 2C50 I          JSR      RDCMDC      ;CARD READER INPUT
45 088E 2101 A          JMP      .+2
46 088F 2C51 I          JSR      RDCMDT      ;TELETYPE KEYBOARD INPUT
47 0890                      ;
48 0890                      ; PACK COMMAND CODE 2 CHARACTERS/WORD
49 0890                      ;
50 0890 8806 B $3:      LD      R2,ACMD2
51 0891                      .ENDIF      ;-----
52 0891 8C0C B          LD      R3,ATBL2
53 0892 2911 A          JSR      $4
54 0893 A200 A          ST      R0,(R2)
55 0894 290F A          JSR      $4
56 0895 A201 A          ST      R0,1(R2)
57 0896                      ;
58 0896                      ; LOCATE COMMAND IN TABLE AND JUMP TO COMMAND PROCESSOR OR INVCMD
59 0896                      ;
60 0896 8200 A $6:      LD      R0,(R2)
61 0897 F300 A          SKNE     R0,(R3)
62 0898 2101 A          JMP      .+2
63 0899 2103 A          JMP      .+4

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GENLDR

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64 089A 8201 A      LD      R0,1(R2)
65 089B F301 A      SKNE    R0,1(R3)
66 089C 2702 A      JMP     @2(R3)
67 089D 4803 A      AISZ    R3,3
68 089E 21F7 A      JMP     $6
69 089F             ;
70 089F             ; ERROR: INVALID OR UNRECOGNIZED COMMAND
71 089F             ;
72 089F 4F01 A      INVCMD: LI      R3,1
73 08A0 2C52 I      JSR      OUTMSG
74 08A1 4C00 A      LI      R0,0
75 08A2 A012 B      ST      R0,INDEVF      ;NEXT COMMAND FROM TTY
76 08A3 21E7 A      JMP     READCM
77 08A4             ;
78 08A4             ;      PACK A WORD FROM INPUT BUFFER
79 08A4             ;
80 08A4 4200 A      $4:    PUSH    R2
81 08A5 8816 B      LD      R2,START
82 08A6 82C0 A      LD      R0,(R2)
83 08A7 5C08 A      SHL     R0,8
84 08A8 3181 A      RCPY    R0,R1
85 08A9 8201 A      LD      R0,1(R2)
86 08AA 3400 A      RADD    R1,R0
87 08AB 4A02 A      AISZ    R2,2
88 08AC A816 B      ST      R2,START
89 08AD 4600 A      PULL    R2
90 08AE 0200 A      RTS     0
91 08AF 0760 A      CPAD:    .WORD   0760

92 08B0             .PAGE
93 08B0             ;*****
94 08B0             ;*
95 08B0             ;* OBS COMMAND
96 08B0             ;*
97 08B0             ;*****
98 08B0             .LOCAL
99 08B0             ;
100 08B0            ; BASE SECTOR ORIGIN MUST BE SPECIFIED IN COMMAND RECORD
101 08B0            ;
102 08B0 2C53 I      ORS:    JSR     VALUE
103 08B1 21ED A      JMP     INVCMD
104 08B2            ;
105 08B2            ; BASE SECTOR ORIGIN MUST BE <= X'00FF
106 08B2            ;
107 08B2 704A B      SKAZ    R0,HFF00
108 08B3 21EB A      JMP     INVCMD
109 08B4            ;
110 08B4            ; SAVE BASE SECTOR ORIGIN IN MAIN PROGRAM VECTOR OR OVERLAY VECTOR
111 08B4            ;
112 08B4 881F B      LD      R2,RLMVCT
113 08B5            .ENDIF
114 08B5 A202 A      ST      R0,BSO(R2)
115 08B6            ;
116 08B6            ; RETURN FOR NEXT COMMAND
117 08B6            ;
118 08B6 21D4 A      JMP     READCM

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119 08B7          .PAGE
120 08B7          ;*****
121 08B7          ;*
122 08B7          ;* OTS COMMAND
123 08B7          ;*
124 08B7          ;*****
125 08B7          .LOCAL
126 08B7          ;
127 08B7          ; TOP SECTOR ORIGIN MUST BE SPECIFIED IN COMMAND RECORD
128 08B7          ;
129 08B7 2C53 I OTS:   JSR      VALUE
130 08B8 2156 A      JMP      INVCMD
131 08B9          ;
132 08B9          ; SAVE TOP SECTOR ORIGIN IN MAIN PROGRAM VECTOR OR OVERLAY VECTOR
133 08B9          ;
134 08B9 881F B      LD       R2,RLMVCT
135 08BA          .ENDIF
136 08BA A203 A      ST       R0,TSO(R2)
137 08BB          ;
138 08BB          ; RETURN FOR NEXT COMMAND
139 08BB          ;
140 08BB 21CF A      JMP      READCM

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141 08BC          .PAGE
142 08BC          ;*****
143 08BC          ;*
144 08BC          ;* ER COMMAND
145 08BC          ;*
146 08BC          ;*****
147 08BC          .LOCAL
148 08BC          ;
149 08BC          ; STHI AND STLO ARE FOUND IN MAIN PROGRAM VECTOR OR OVERLAY VECTOR
150 08BC          ;
151 08BC 4C01 A ER:    LI       R0,1
152 08BD A01C B      ST       R0,TEMP1
153 08BE 2102 A      JMP      SY1
154 08BF          ;*****
155 08BF          ;*
156 08BF          ;* SY COMMAND
157 08BF          ;*
158 08BF          ;*****
159 08BF          .LOCAL
160 08BF          ;
161 08BF          ; STHI AND STLO ARE FOUND IN MAIN PROGRAM VECTOR OR OVERLAY VECTOR
162 08BF          ;
163 08BF 4C00 A SY:    LI       R0,0
164 08C0 A01C B      ST       R0,TEMP1
165 08C1 881F B SY1:  LD       R2,RLMVCT
166 08C2          .ENDIF
167 08C2 8201 A      LD       R0,STLO(R2)
168 08C3 A018 B      ST       R0,STLOW
169 08C4 8A00 A      LD       R2,STHI(R2)
170 08C5          ;
171 08C5          ; IF (R2) = STLOW, NO MORE ENTRIES IN SYMBOL TABLE
172 08C5          ;
173 08C5 F818 B $1:   SKNE     R2,STLOW
174 08C6 2109 A      JMP      $4
175 08C7 801C B      LD       R0,TEMP1
176 08C8 1104 A      BOC      ZRO,$2
177 08C9          ;
178 08C9          ; IF SYMBOL IS MULTIPLY-DEFINED OR UNDEFINED, PRINT IT
179 08C9          ;
180 08C9 82FF A      LD       R0,-1(R2)
181 08CA 6048 B      AND      R0,HA000
182 08CB F047 B      SKNE     R0,H8000

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183 08CC 2101 A      JMP      $3
184 08CD 2C54 I $2:   JSR      PRSYMB
185 08CE           ;
186 08CE           ; INCREMENT TO NEXT SYMBOL
187 08CE           ;
188 08CE 4AF8 A $3:   AISZ     R2,-5
189 08CF 21F5 A      JMP      $1
190 08D0 8443 B $4:   LD       R1,HOD0A
191 08D1 2C4D I      JSR      OUTWD
192 08D2 2188 A      JMP      READCM

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193 08D3           .PAGE
194 08D3           ;*****
195 08D3           ;*
196 08D3           ;* NLM AND LM COMMANDS
197 08D3           ;*
198 08D3           ;*****
199 08D3           .LOCAL
200 08D3           ;
201 08D3           ; SET FLAG TO INHIBIT PRINTING LIMITS
202 08D3           ;
203 08D3 4C00 A NLM:    LI      RO,0
204 08D4 2101 A      JMP      $1
205 08D5           ;
206 08D5           ; SET FLAG TO PRINT LIMITS
207 08D5           ;
208 08D5 4C01 A LM:     LI      RO,1
209 08D6           ;
210 08D6           ; SAVE LIMITS FLAG AND RETURN FOR NEXT COMMAND
211 08D6           ;
212 08D6 A013 B $1:    ST       RO,LIMFLG
213 08D7 21B3 A      JMP      READCM

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214 08D8           .SPACE 3
215 08D8           ;*****
216 08D8           ;*
217 08D8           ;* NSQ AND SQ COMMANDS
218 08D8           ;*
219 08D8           ;*****
220 08D8           .LOCAL
221 08D8           ;
222 08D8           ; INHIBIT SEQUENCE CHECK
223 08D8           ;
224 08D8 4C00 A NSEQ:   LI      RO,0
225 08D9 2101 A      JMP      $1
226 08DA           ;
227 08DA           ; PERFORM SEQUENCE CHECK (CARDS ONLY)
228 08DA           ;
229 08DA 4C01 A SEQ:    LI      RO,1
230 08DB A009 B $1:    ST       RO,SEQCK
231 08DC 21AE A      JMP      READCM

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232 08DD           .PAGE
233 08DD           ;*****
234 08DD           ;*
235 08DD           ;* CR AND TTY COMMANDS
236 08DD           ;*
237 08DD           ;*****
238 08DD           .LOCAL
239 08DD           ;
240 08DD           ; SET FLAG FOR CARD READER INPUT
241 08DD           ;
242 08DD 4C01 A CR:     LI      RO,1

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GENLDR

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243 08DE 2101 A      JMP      $1
244 08DF             ;
245 08DF             ; SET FLAG FOR TTY INPUT
246 08DF             ;
247 08DF 4C00 A TTY:   LI      R0,0
248 08E0             ;
249 08E0             ; SAVE INPUT DEVICE FLAG AND RETURN FOR NEXT COMMAND
250 08E0             ;
251 08E0 A012 B $1:    ST      R0,INDEVF
252 08E1 21A9 A      JMP      READCM

```

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253 08E2             .PAGE
254 08E2             ;*****
255 08E2             ;*
256 08E2             ;* CLR COMMAND
257 08E2             ;*
258 08E2             ;*****
259 08E2             .LOCAL
260 08E2             ;
261 08E2             ; INITIALIZE RLM VECTOR
262 08E2             ;
263 08E2 881E B CLR:   LD      R2,INVCT
264 08E3 8C1F B      LD      R3,RLMVCT
265 08E4             .ENDIF
266 08E4 4D0D A      LI      R1,LVCT
267 08E5 8200 A      LD      R0,(R2)
268 08E6 A300 A      ST      R0,(R3)
269 08E7 4801 A      AISZ    R3,1
270 08E8 4A01 A      AISZ    R2,1
271 08E9 49FF A      AISZ    R1,-1
272 08EA 21FA A      JMP      .-5
273 08EB             .IF     GENL
274 08EB 790C A      ISZ     CLRFLG
275 08EC             ;
276 08EC             .ENDIF
277 08EC             ;
278 08EC             ; ZERO MEMORY RANGE 1
279 08EC             ;
280 08EC 4C00 A      LI      R0,0
281 08ED 8800 B      LD      R2,LOW1
282 08EE 2C55 I      JSR     STORE
283 08EF 4A01 A      AISZ    R2,1
284 08F0 E802 B      SKG     R2,HIGH1
285 08F1 21FC A      JMP      .-3
286 08F2             ;
287 08F2             ; ZERO MEMORY RANGE 2
288 08F2             ;
289 08F2 8803 B      LD      R2,LOW2
290 08F3 2C55 I      JSR     STORE
291 08F4 4A01 A      AISZ    R2,1
292 08F5 E805 B      SKG     R2,HIGH2
293 08F6 21FC A      JMP      .-3
294 08F7             ;
295 08F7             ; RETURN FOR NEXT COMMAND
296 08F7             ;
297 08F7 2193 A      JMP      READCM
298 08F8             .IF     GENL
299 08F8 0000 A CLRFLG: .WORD   0
300 08F9             .ENDIF

```

;.

;REMEMBER SO THAT SYMB TBL AREA CAN
BE CLEARED LATER

;.

;.

;.

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301 08F9          .PAGE
302 08F9          ;*****
303 08F9          ;*
304 08F9          ;* RLM COMMAND
305 08F9          ;*
306 08F9          ;*****
307 08F9          .LOCAL
308 08F9          ;
309 08F9          ; INITIALIZE RLM VECTOR
310 08F9          ;
311 08F9          .IF      GENL          ;. . . . .
312 08F9 8013 B RLM: LD      RO,LIMFLG    ;IF LIMITS FLAG SET, REINITIALIZE
313 08FA 1108 A      BOC      ZRO,$1      ;RLM VECTOR
314 08FB 881E B      LD      R2,INVCT
315 08FC 8C1F B      LD      R3,RLMVCT
316 08FD          .IF      GENL          ;. . . . .
317 08FD 4A04 A      AISZ     R2,4        ;DON,T REINIT FIRST 4 WORDS
318 08FE 4B04 A      AISZ     R3,4
319 08FF 4D07 A      LI      R1,LVCT-6
320 0900          .ENDIF
321 0900 8200 A      LD      RO,(R2)      ;. . . . .
322 0901 A300 A      ST      RO,(R3)
323 0902 4B01 A      AISZ     R3,1
324 0903 4A01 A      AISZ     R2,1
325 0904 49FF A      AISZ     R1,-1
326 0905 21FA A      JMP      .-5
327 0906 8C1F B $1: LD      R3,RLMVCT
328 0907 7F0C A      DSZ      PTRP(R3)
329 0908 830C A      LD      RO,PTRP(R3)
330 0909 A30B A      ST      RO,PTRN(R3)
331 090A          ;
332 090A          ; READ 1 RLM RECORD FROM TTY PAPER TAPE READER OR CARD READER
333 090A          ;
334 090A 8012 B $2A: LD      RO,INDEVF
335 090B 1102 A      BOC      ZRO,+.3
336 090C 2C56 I      JSR      RDRLMC
337 090D 2101 A      JMP      .+2
338 090E 2C57 I      JSR      RDRLMT
339 090F          ;
340 090F          ; CALL LODREC TO PROCESS RLM RECORD
341 090F          ;
342 090F 8C1F B      LD      R3,RLMVCT
343 0910 2C58 I      JSR      LODREC
344 0911 2103 A      JMP      $2          ;ERROR RETURN
345 0912 2106 A      JMP      $3          ;TITLE RETURN
346 0913 2119 A      JMP      $4          ;END RETURN
347 0914 21F5 A      JMP      $2A        ;NORMAL RETURN
348 0915          ;
349 0915          ; ERROR RETURN FROM LODREC WITH ERROR CODE IN R3 (1 <= R3 <= 10)
350 0915          ;
351 0915 4B07 A $2:  AISZ     R3,ML
352 0916 2C52 I      JSR      OUTMSG
353 0917 0000 A      HALT
354 0918 21F1 A      JMP      $2A
355 0919          ;
356 0919          ; PRINT TITLE RECORD IF LIMITS FLAG IS SET
357 0919          ;
358 0919 8013 B $3:  LD      RO,LIMFLG
359 091A 11EF A      BOC      ZRO,$2A
360 091B 8443 B      LD      R1,HODOA
361 091C 2C4D I      JSR      OUTWD
362 091D 8C07 B      LD      R3,AINBUF
363 091E 4B04 A      AISZ     R3,4
364 091F 4E06 A      LI      R2,6
365 0920 2C4F I      JSR      OUTANS
366 0921 8446 B      LD      R1,H2020

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GENLDR

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367 0922 2C4D I      JSR      OUTWD
368 0923 8C07 B      LD       R3,AINBUF
369 0924 4807 A      AISZ     R3,7
370 0925 9007 B      LD       R0,@AINBUF
371 0926 6041 B      AND      R0,H00FF
372 0927 5C01 A      SHL      R0,1
373 0928 D02A B      SUB      R0,H000A
374 0929 3281 A      RCPY     R0,R2
375 092A 1101 A      BOC      ZRO,+.2
376 092B 2C4F I      JSR      OUTANS
377 092C 21DD A      JMP      $2A
378 092D              ;
379 092D              ; PRINT RLM LIMITS IF LIMITS FLAG IS SET
380 092D              ;
381 092D 881F B $4:   LD       R2,RLMVCT
382 092E              .IF      GENL
383 092E 8204 A      LD       R0,ENTPT(R2) ; IF RLM ENTRY POINT IS NON-ZERO,
384 092F 1101 A      BOC      ZRO,$4A
385 0930 A001 B      ST       R0,ENTY ; SAVE VALUE FOR GO
386 0931              .ENDIF
387 0931 8013 B $4A: LD       R0,LIMFLG
388 0932 110C A      BOC      ZRO,$5
389 0933 8446 B      LD       R1,H2020 ; PRINT FOUR BLANKS
390 0934 2C4D I      JSR      OUTWD
391 0935 2C4D I      JSR      OUTWD
392 0936 8C07 B      LD       R3,AINBUF ; PRINT SOURCE CHECKSUM
393 0937 8704 A      LD       R1,4(R3)
394 0938 2C59 I      JSR      OUTHEX
395 0939 8446 B      LD       R1,H2020 ; PRINT FOUR BLANKS
396 093A 2C4D I      JSR      OUTWD
397 093B 2C4D I      JSR      OUTWD
398 093C 8705 A      LD       R1,5(R3) ;PRINT OBJECT CHECKSUM
399 093D 2C59 I      JSR      OUTHEX
400 093E 2C5A I      JSR      PRLIMS
401 093F 245B I $5:   JMP      READCM
402 0940              .ENDIF ;-----

403 0940              .PAGE
404 0940              ;*****
405 0940              ;*
406 0940              ;* GO COMMAND
407 0940              ;*
408 0940              ;*****
409 0940              .LOCAL
410 0940 881F B GO:   LD       R2,RLMVCT ;GET VECTOR ADDRESS
411 0941 2C53 I      JSR      VALUE
412 0942              .ENDIF ;-----
413 0942 2101 A      JMP      .+2
414 0943 2107 A      JMP      $1
415 0944 8001 B      LD       R0,ENTY
416 0945              .ENDIF ;-----
417 0945 1505 A      BOC      NZERO,$1
418 0946 4F03 A      LI       R3,3
419 0947 2C52 I      JSR      OUTMSG
420 0948 4C00 A      LI       R0,0
421 0949 A012 B      ST       R0,INDEVF
422 094A 245B I      JMP      READCM
423 094B              ;
424 094B              ; ENTRY POINT FROM COMMAND RECORD REPLACES ENTRY POINT IN VECTOR
425 094B              ;
426 094B 3181 A $1:   RCPY     R0,R1
427 094C 881F B      LD       R2,RLMVCT
428 094D              .ENDIF ;-----
429 094D A604 A      ST       R1,ENTPT(R2)
430 094E              ;
431 094E              ; PRINT COMPOSITE LIMITS
432 094E              ;

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GENLDR

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433 094E 4200 A $2:   PUSH    R2
434 094F 2C5A I       JSR      PRLIMS
435 0950 4600 A       PULL     R2
436 0951             .IF      GENL           ;. . . . .
437 0951             ;
438 0951             ;       MOVE PSEUDO-BASE SECTOR TO ACTUAL BASE SECTOR
439 0951             ;
440 0951 8114 A $2B:   LD        RO,$B0
441 0952 A114 A       ST         RO,$B1
442 0953 8404 B       LD         R1,BSZ           ;END OF BASE SECTOR
443 0954 4901 A       AISZ      R1,1
444 0955 4F00 A       LI         R3,0
445 0956 9110 A $2A:   LD         RO,@$B1
446 0957 A300 A       ST         RO,(R3)
447 0958 790E A       ISZ       $B1
448 0959 4801 A       AISZ      R3,1
449 095A 49FF A       AISZ      R1,-1           ;TEST FOR END
450 095B 21FA A       JMP        $2A
451 095C 8E04 A       LD         R3,ENTPT(R2)
452 095D 819A A       LD         RO,CLRFLG
453 095E 1501 A       BOC        NZERO,$3       ;IF BRANCH, CLEAR REMAINDER OF MEMORY
454 095F 2300 A       JMP        (R3)           ;JUMP TO ENTRY POINT
455 0960 8A01 A $3:   LD         R2,STLO(R2)     ;CLEAR LOADER AREAS
456 0961 3981 A       RCPY      R2,R1
457 0962 5101 A       CAI        R1,1
458 0963 C504 A       ADD        R1,$CL
459 0964 4C00 A       LI         RO,0
460 0965 2502 A       JMP        @$CL           ;JUMP TO 'CLEAR' ROUTINE

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461 0966             .SPACE    2
462 0966 0C43 T $B0:   .WORD     PBSEC
463 0967 0C43 T $B1:   .WORD     PBSEC
464 0968 0FC1 T $CL:   .WORD     CLEAR
465 0969             .ENDIF           ;. . . . .

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```

466 0969             .PAGE
467 0969             ;*****
468 0969             ;*
469 0969             ;* READ COMMAND FROM TELETYPE KEYBOARD INTO INBUF
470 0969             ;*
471 0969             ;*****
472 0969             .LOCAL
473 0969             ;
474 0969             ; WRITE PROMPT CHARACTER (EXCLAMATION) AND INITIALIZE BUFFER
475 0969             ;
476 0969 8810 B RDCMDT: LD        R2,ACRDBUF
477 096A A816 B       ST         R2,START
478 096B 8443 B       LD         R1,HODOA
479 096C 2C4D I       JSR        OUTWD
480 096D 8030 B       LD         RO,H0021
481 096E 2C5C I       JSR        OUTCH
482 096F A200 A       ST         RO,(R2)
483 0970 4A01 A       AISZ      R2,1
484 0971             ;
485 0971             ; READ AND ECHO CHARACTER
486 0971             ;
487 0971 4C01 A $1:   LI         RO,1
488 0972 2948 A       JSR        READCH
489 0973             ;
490 0973             ; TEST FOR SPECIAL FUNCTION CHARACTERS
491 0973             ;
492 0973 F02B B       SKNE      RO,H000D
493 0974 2110 A       JMP        $2           ;CARRIAGE RETURN
494 0975 F02A B       SKNE      RO,H000A
495 0976 2111 A       JMP        $3           ;LINE FEED
496 0977 F025 B       SKNE      RO,H0000

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GENLDR

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497 0978 21F8 A      JMP      $1          ;NULL
498 0979 F03E B      SKNE     R0,H007F
499 097A 21F6 A      JMP      $1          ;RUBOUT
500 097B F03B B      SKNE     R0,H005F
501 097C 210E A      JMP      $4          ;BACKSPACE
502 097D F03C B      SKNE     R0,H007D
503 097E 2110 A      JMP      $5          ;ESCAPE
504 097F             ;
505 097F             ; IF MAXIMUM LINE SIZE EXCEEDED, IGNORE CHARACTER
506 097F             ;
507 097F E808 B      SKG      R2,ENDBUF
508 0980 2101 A      JMP      .+2
509 0981 21EF A      JMP      $1
510 0982             ;
511 0982             ; STORE CHARACTER IN BUFFER, INCREMENT POINTER, AND LOOP FOR NEXT CHAR
512 0982             ;
513 0982 A200 A      ST        R0,(R2)
514 0983 4A01 A      AISZ     R2,1
515 0984 21EC A      JMP      $1
516 0985             ;
517 0985             ; OUTPUT LINE FEED AND TERMINATE LINE
518 0985             ;
519 0985 802A B $2:   LD        R0,H000A
520 0986 2C5C I      JSR      OUTCH
521 0987 210A A      JMP      $6
522 0988             ;
523 0988             ; OUTPUT CARRIAGE RETURN AND TERMINATE LINE
524 0988             ;
525 0988 802B B $3:   LD        R0,H000D
526 0989 2C5C I      JSR      OUTCH
527 098A 2107 A      JMP      $6
528 098B             ;
529 098B             ; BACKSPACE 1 CHARACTER. IF ENTIRE LINE DELETED, REPROMPT
530 098B             ;
531 098B 4AFF A $4:   AISZ     R2,-1
532 098C F810 B      SKNE     R2,ACRDBUF
533 098D 2101 A      JMP      $5
534 098E 21E2 A      JMP      $1
535 098F             ;
536 098F             ; DELETE ENTIRE LINE AND REPROMPT
537 098F             ;
538 098F 8443 B $5:   LD        R1,H000A
539 0990 2C4D I      JSR      OUTWD
540 0991 21D7 A      JMP      RDCMDT
541 0992             ;
542 0992             ; TERMINATE LINE WITH EOR AND RETURN
543 0992             ;
544 0992 802F B $6:   LD        R0,H0020
545 0993 A200 A      ST        R0,(R2)
546 0994 8041 B      LD        R0,H00FF
547 0995 A201 A      ST        R0,1(R2)
548 0996 0200 A      RTS        0

549 0997             .PAGE
550 0997             ;*****
551 0997             ;*
552 0997             ;* READ RLM RECORD FROM 8-CHANNEL TTY PAPER TAPE READER INTO INBUF
553 0997             ;*
554 0997             ;*****
555 0997             .LOCAL
556 0997             ;
557 0997             ; SEND 'XON' TO READER
558 0997             ;
559 0997 802C B RDRMT: LD        R0,H0011
560 0998 2C5C I      JSR      OUTCH

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561 0999      ;
562 0999      ;      SEARCH FOR 'STX' CHARACTER
563 0999      ;
564 0999 4C00 A $A:      LI      R0,0
565 099A 2920 A      JSR      READCH
566 099B F026 B      SKNE     R0,H0002      ;STX CHARACTER
567 099C 2101 A      JMP      .+2
568 099D 21FB A      JMP      $A
569 099E      ;
570 099E      ; READ FIRST WORD AND EXTRACT RECORD LENGTH
571 099E      ;
572 099E 8807 B      LD      R2,AINBUF
573 099F 290E A      JSR      $2
574 09A0 A600 A      ST      R1,(R2)
575 09A1 6441 B      AND      R1,H00FF
576 09A2 4A01 A      AISZ     R2,1
577 09A3 C407 B      ADD      R1,AINBUF
578 09A4 4901 A      AISZ     R1,1
579 09A5 A511 A      ST      R1,$T1
580 09A6      ;
581 09A6      ; READ REMAINDER OF RLM RECORD
582 09A6      ;
583 09A6 2907 A $1:      JSR      $2
584 09A7 A600 A      ST      R1,(R2)
585 09A8 4A01 A      AISZ     R2,1
586 09A9 E90D A      SKG      R2,$T1
587 09AA 21FB A      JMP      $1
588 09AB      ;
589 09AB      ; SEND 'XOFF' AND RETURN
590 09AB      ;
591 09AB 802D B      LD      R0,H0013
592 09AC 2971 A      JSR      OUTCH
593 09AD 0200 A      RTS      0
594 09AE      ;
595 09AE      ;
596 09AE      .IF      IMP16L
597 09AE 2C5D I $2:      JSR      SAVE
598 09AF 2D09 A TGET1: JSR@    PTGET
599 09B0 5C08 A      SHL      R0,8
600 09B1 A106 A      ST      R0,$T2      ;SAVE FIRST CHAR
601 09B2      .IF      IMP16L
602 09B2 2D06 A TGET2: JSR@    PTGET
603 09B3 C104 A      ADD      R0,$T2      ;BUILD FULL WORD
604 09B4 805E I      ST      R0,SRREG+1
605 09B5 2C5F I      JSR      REST
606 09B6 0200 A      RTS      0
607 09B7      ;
608 09B7      ; TEMPORARY
609 09B7      ;
610 09B7 0000 A $T1:      .WORD    0
611 09B8 09B9 T $T2:      .=.+1

612 09B9      .PAGE
613 09B9      ;*****
614 09B9      ;*
615 09B9      ;* READ 1 CHARACTER FROM TTY (KEYBOARD OR PAPER TAPE) INTO R0
616 09B9      ;*
617 09B9      ;*****
618 09B9      .LOCAL
619 09B9      .IF      IMP16L
620 09B9 7E3B A PTGET:      .WORD    07E3B
621 09BA 7E73 A PTECHO:     .WORD    07E73
622 09BB 2C5D I READCH: JSR      SAVE
623 09BC 1102 A      BOC      1,TGET3
624 09BD 20FC A LEC01: JSR      @PTECHO

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GENLDR

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625 09BE 2101 A      JMP      .+2
626 09BF 2DF9 A TGET3: JSR      @PTGET
627 09C0 B060 I      ST       R0,SRREG
628 09C1 2C5F I      JSR      REST
629 09C2 603E B      AND      R0,H007F
630 09C3 0200 A      RTS      0

631 09C4              .PAGE
632 09C4              ;*****
633 09C4              ;*
634 09C4              ;* READ COMMAND FROM CARD READER INTO INBUF
635 09C4              ;*
636 09C4              ;*****
637 09C4              .LOCAL
638 09C4              ;
639 09C4              ; READ 1 CARD AND CONVERT COLUMNS 1-72 TO ANSI
640 09C4              ;
641 09C4 295F A RDCMDC: JSR      RDCARD
642 09C5 4C00 A      LI       R0,0          ;IN READING COMMANDS, CRDFLG NOT USED
643 09C6 A00B B      ST       R0,CRDFLG
644 09C7              ;
645 09C7              ; TERMINATE RECORD WITH EOR CHARACTER
646 09C7              ;
647 09C7 8041 B      LD       R0,H00FF
648 09C8 8810 B      LD       R2,ACRDBUF
649 09C9 A248 A      ST       R0,72(R2)
650 09CA              ;
651 09CA              ; INITIALIZE SCAN STARTING ADDRESS AND RETURN
652 09CA              ;
653 09CA 8010 B      LD       R0,ACRDBUF
654 09CB A016 B      ST       R0,START
655 09CC 0200 A      RTS      0

656 09CD              .PAGE
657 09CD              ;*****
658 09CD              ;*
659 09CD              ;* READ RLM RECORD FROM CARD READER INTO INBUF
660 09CD              ;*
661 09CD              ;*****
662 09CD              .LOCAL
663 09CD              ;
664 09CD              ; READ 1 CARD AND CONVERT COLUMNS 1-72 TO ANSI
665 09CD              ;
666 09CD 2956 A RDRLMC: JSR      RDCARD
667 09CE 8810 B      LD       R2,ACRDBUF
668 09CF A81C B      ST       R2,TEMP1
669 09D0              ;
670 09D0              ; PACK RLM RECORD
671 09D0              ;
672 09D0 8807 B      LD       R2,AINBUF
673 09D1 4C11 A      LI       R0,17
674 09D2 3800 A      RADD     R2,R0
675 09D3 A11C A      ST       R0,$T1
676 09D4 2908 A $1:   JSR      $2
677 09D5 A600 A      ST       R1,(R2)
678 09D6 4A01 A      AISZ     R2,1
679 09D7 E918 A      SKG      R2,$T1
680 09D8 21FB A      JMP      $1
681 09D9 2C61 I      JSR      CARDIN
682 09DA 4C01 A      LI       R0,1          ;SET FLAG INDICATING NEW CARD READ
683 09DB A00B B      ST       R0,CRDFLG
684 09DC 0200 A      RTS      0
685 09DD              ;
686 09DD              ; SUBROUTINE: PACK 4 CHARACTERS/WORD
687 09DD              ;

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688 09D0 4D00 A $2:    LI      R1,0
689 09DE 2904 A        JSR      $3
690 09DF 2903 A        JSR      $3
691 09E0 2902 A        JSR      $3
692 09E1 2901 A        JSR      $3
693 09F2 0200 A        RTS      0
694 09E3 901C B $3:    LD      R0,@TEMP1
695 09E4 290C A        JSR      ANSHEX
696 09E5 2102 A        JMP      $5
697 09E6 781C B $4:    ISZ     TEMP1
698 09E7 0200 A        RTS      0
699 09E8          ;
700 09E8          ; ERROR -- INVALID HEX CHARACTER
701 09E8          ;
702 09E8 4F04 A $5:    LI      R3,4
703 09E9 2C52 I        JSR      OUTMSG
704 09EA 0000 A        HALT
705 09EB 4C00 A        LI      R0,0
706 09EC A00B B        ST      R0,CRDFLG
707 09ED 4400 A        PULL    R0
708 09EE 4400 A        PULL    R0
709 09EF 21D0 A        JMP      RDRLMC
710 09F0          ;
711 09F0          ; TEMPORARY
712 09F0          ;
713 09F0 0000 A $T1:   .WORD    0
714 09F1          ;
715 09F1          ; CONVERT A CHARACTER FROM ANSI TO HEX
716 09F1          ; INPUT CHARACTER IN R0
717 09F1          ; HEX VALUE PACKED INTO R1
718 09F1          ;
719 09F1          ; RETURNS:
720 09F1          ; CALL+1  ERROR
721 09F1          ; CALL+2  OK
722 09F1          ;
723 09F1          ; .LOCAL
724 09F1 7449 B ANSHEX: SKAZ    R1,HF000
725 09F2 0200 A        RTS      0
726 09F3 5D04 A        SHL     R1,4
727 09F4 F02F B        SKNE    R0,H0020
728 09F5 0201 A $2:    RTS      1
729 09F6 D032 B        SUB     R0,H0030
730 09F7 11FD A        BOC     ZR0,$2
731 09F8 1201 A        BOC     PZR0,$3
732 09F9 0200 A        RTS      0
733 09FA E029 B $3:    SKG     R0,H0009
734 09FB 2101 A        JMP      $4
735 09FC 48F9 A        AISZ    R0,-7
736 09FD 3100 A $4:    RADD    R0,R1
737 09FE 0201 A        RTS      1
738 09FF          .IF      IMP16L

739 09FF          .PAGE
740 09FF          .LOCAL
741 09FF          ;*****
742 09FF          ;*
743 09FF          ;*  INITIALIZATION ROUTINE FOR 16L
744 09FF          ;*
745 09FF          ;*****
746 09FF          ;
747 09FF          ;
748 09FF          ;
749 09FF          ;
750 09FF 03FB A LTGET:  JSRI     OFFFB
751 0A00 2C62 I LTECO:  JSR      LTECHO
752 0A01 0A05 T LCRDP:  .WORD    LCRD

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GENLDR

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753 0A02 0A8E T RCRD1P: .WORD RCRD1
754 0A03 6027 B LOLCHK: AND R0,H0004
755 0A04 4F01 A STATP: LI R3,STATUS
756 0A05 ;
757 0A05 0610 A LCRD: ROUT CARDR
758 0A06 1C01 A BOC POA,+.2
759 0A07 21FD A JMP .-2
760 0A08 ;
761 0A08 81F6 A LINIT: LD R0,LTGET
762 0A09 A1A5 A ST R0,TGET1
763 0A0A A1A7 A ST R0,TGET2
764 0A0B A1B3 A ST R0,TGET3
765 0A0C 81F3 A LD R0,LTECO
766 0A0D A1AF A ST R0,LECO1
767 0A0E 810E A LD R0,LTYYTI
768 0A0F A111 A ST R0,TTYT1
769 0A10 81F2 A LD R0,LOLCHK
770 0A11 A178 A ST R0,OLCHK
771 0A12 81F1 A LD R0,STATP
772 0A13 A113 A ST R0,STATCK
773 0A14 4F03 A LI R3,3
774 0A15 91EB A $L1: LD R0,@LCRDP
775 0A16 81EB A ST R0,@RCRD1P
776 0A17 79E9 A ISZ LCRDP
777 0A18 79E9 A ISZ RCRD1P
778 0A19 4BFF A AISZ R3,-1
779 0A1A 21FA A JMP $L1
780 0A1B 0200 A RTS
781 0A1C .ENDIF

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782 0A1C .PAGE
783 0A1C ;*****
784 0A1C ;*
785 0A1C ;* OUTPUT 1 ANSI CHARACTER TO TTY PRINTER *
786 0A1C ;* *
787 0A1C ;*****
788 0A1C .LOCAL
789 0A1C ;
790 0A1C ; ON ENTRY: R0 <-- 1 ANSI CHARACTER (RIGHTMOST 8 BITS)
791 0A1C ;
792 0A1C .IF IMP16L
793 0A1C 7E59 A PTTYT: .WORD 07E59
794 0A1D 2C63 I LTTYTI: JSR LTTYT
795 0A1E 6041 B OUTCH: AND R0,H00FF
796 0A1F 2979 A JSR SAVE
797 0A20 3181 A RCPY R0,R1
798 0A21 2DFA A TTYT1: JSR@ PTTYT ; PRINT CHARACTER
799 0A22 297B A JSR REST
800 0A23 0200 A RTS 0
801 0A24 ;

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802 0A24 .PAGE
803 0A24 ;*****
804 0A24 ;*
805 0A24 ;* READ 1 CARD INTO INBUF AND CONVERT TO ANSI *
806 0A24 ;* *
807 0A24 ;*****
808 0A24 .LOCAL
809 0A24 800B B RDCARD: LD R0,CRDFLG ;HAS CARD ALREADY BEEN READ?
810 0A25 1501 A BOC NZERO,+.2 ;YES
811 0A26 2961 A $1B: JSR CARDIN
812 0A27 ;
813 0A27 ; TEST FOR ERRORS AND LOOP UNTIL I/O COMPLETED
814 0A27 ;
815 0A27 STATCK:
816 0A27 2105 A $1A: JMP $1-1

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817 0A28 0410 A      RIN      CARDR
818 0A29 7040 B      SKAZ      R0,H00C0
819 0A2A 215B A      JMP      $7
820 0A2B 7028 B      SKAZ      R0,H0008
821 0A2C 21FB A      JMP      .-4
822 0A2D              ;
823 0A2D              ; TRANSLATE TO ANSI AND RETURN
824 0A2D              ;
825 0A2D 8810 B      LD        R2,ACRDBUF
826 0A2E 8C0D B $1:   LD        R3,ATBL3
827 0A2F 8200 A      LD        R0,(R2)
828 0A30 F300 A $2:   SKNE      R0,(R3)
829 0A31 2104 A      JMP      $3
830 0A32 4B01 A      AISZ      R3,1
831 0A33 EC0E B      SKG       R3,ETBL3
832 0A34 21FB A      JMP      $2
833 0A35 214C A      JMP      $5          ;ERROR -- INVALID CHARACTER
834 0A36 DC0D B $3:   SUB        R3,ATBL3
835 0A37 4B20 A      AISZ      R3,020
836 0A38 EC30 B      SKG       R3,H0021
837 0A39 2104 A      JMP      $4
838 0A3A 4B0E A      AISZ      R3,00E
839 0A3B EC34 B      SKG       R3,H0039
840 0A3C 2101 A      JMP      $4
841 0A3D 4B07 A      AISZ      R3,007
842 0A3E AE00 A $4:   ST        R3,(R2)
843 0A3F 4A01 A      AISZ      R2,1
844 0A40 E808 B      SKG       R2,ENDBUF
845 0A41 21EC A      JMP      $1
846 0A42 8009 B      LD        R0,SEQCK          ;DO WE PERFORM SEQUENCE CHECK?
847 0A43 112B A      BOC        ZR0,$FIN          ;NO
848 0A44 4AF8 A      AISZ      R2,-8
849 0A45 8C0A B      LD        R3,NUMB          ;ADDRESS OF CURRENT NUMBER VECTOR
850 0A46 8200 A $CKSEQ: LD        R0,0(R2)          ;SEQUENCE CHECK CHAR-BY-CHAR
851 0A47 E301 A      SKG       R0,1(R3)
852 0A48 2101 A      JMP      .+2
853 0A49 2108 A      JMP      $SEQGT
854 0A4A 4A01 A      AISZ      R2,1
855 0A4B 4B01 A      AISZ      R3,1
856 0A4C E808 B      SKG       R2,ENDBUF
857 0A4D 21F8 A      JMP      $CKSEQ
858 0A4E 4F12 A      LI        R3,18          ;SEQUENCE FAILURE - WRITE MESSAGE
859 0A4F 2C52 I      JSR        OUTMSG
860 0A50 0C00 A      HALT
861 0A51 210F A      JMP      $SEQOK;
862 0A52          $SEQGT: ; SEQUENCE NUMBER IS GREATER SO CHECK FOR BEING TOO GREAT
863 0A52 D301 A      SUB        R0,1(R3);          TAKE DIFFERENCE OF CHARS
864 0A53 F808 B      SKNE      R2,ENDBUF;          ARE WE ON THE LAST CHAR?
865 0A54 2107 A      JMP      $SQG1;          YES
866 0A55 48FF A      AISZ      R0,-1;          DIFFERENCE MUST BE 1 OR DIFF IS TOO BIG
867 0A56 2107 A      JMP      $SEQR;          X
868 0A57 4A01 A      AISZ      R2,1;
869 0A58 4B01 A      AISZ      R3,1;
870 0A59 4C0A A      LI        R0,10;          GET NEXT CHAR FROM CARD WITH BORROW
871 0A5A C200 A      ADD        R0,0(R2);          ADDED IN
872 0A5B 21F6 A      JMP      $SEQGT;
873 0A5C          ; WHEN LAST CHAR IS PROCESSED DIFFERENCE SHOULD BE LESS THAN 10
874 0A5C          $SQG1:
875 0A5C E02A B      SKG       R0,H000A;
876 0A5D 2103 A      JMP      $SEQOK;          ALL IS CLEAR
877 0A5E          $SEQR: ; SEQUENCE NUM INCREMENTED BY MORE THAN 10 SO THERE IS AN ERROR
878 0A5E 4F13 A      LI        R3,19;          "DROP"
879 0A5F 2C52 I      JSR        OUTMSG;
880 0A60 0000 A      HALT
881 0A61          ; PRINT SEQUENCE NUMBER IF NOT A MULTIPLE OF TEN
882 0A61 9008 B $SEQOK: LD        R0,0ENDBUF;          CHECK FOR LAST DIGIT OF 0
883 0A62 F032 B      SKNE      R0,H0030;
884 0A63 210B A      JMP      $FIN;

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885 0A64      ; PRINT IDENTIFYING MESSAGE
886 0A64 4F14 A      LI      R3,20;
887 0A65 2C52 I      JSR      OUTMSG;
888 0A66 8446 B      LD      R1,H2020;
889 0A67 2C4D I      JSR      OUTWD;
890 0A68      ; LOOP TO PRINT CHARS IN NMBR
891 0A68 8C08 B      LD      R3,ENDBUF;
892 0A69 4D08 A      LI      R1,8;
893 0A6A      $SQP:   ;
894 0A6A 83F9 A      LD      R0,-7(R3);
895 0A6B 29B2 A      JSR      OUTCH;
896 0A6C 4B01 A      AISZ    R3,1;
897 0A6D 49FF A      AISZ    R1,-1;
898 0A6E 21FB A      JMP      $SQP;
899 0A6F 4F08 A $FIN:  LI      R3,8          ;SAVE SEQUENCE NUMBER
900 0A70 CC0A B      ADD      R3,NUMB
901 0A71 8808 B      LD      R2,ENDBUF
902 0A72 8200 A $SEQMOV:LD      R0,{R2}
903 0A73 A300 A      ST      R0,{R3}
904 0A74 4AFF A      AISZ    R2,-1
905 0A75 4BFF A      AISZ    R3,-1
906 0A76 EC3A B      SKG      R3,NUMB
907 0A77 2101 A      JMP      .+2
908 0A78 21F9 A      JMP      $SEQMOV
909 0A79 0200 A      RTS
910 0A7A 00C0 A NMBR:  .WORD    0,0,0,0,0,0,0,0
      0A7B 0000 A
      0A7C 0000 A
      0A7D 0000 A
      0A7E 0000 A
      0A7F 0000 A
      0A80 0000 A
      0A81 0000 A
911 0A82      :
912 0A82      ; ERROR -- INVALID PUNCH
913 0A82      ;
914 0A82 4F05 A $5:    LI      R3,5
915 0A83 2C52 I      JSR      OUTMSG
916 0A84 0000 A      HALT
917 0A85 21A0 A      JMP      $1B
918 0A86 290C A $7:    JSR      $6          ;PROCESS ERROR
919 0A87 219F A      JMP      $1A          ;CONTINUE LOADING
920 0A88      ;
921 0A88      ; READ A CARD - IF CARDREADER OFFLINE, ERROR
922 0A88      ;
923 0A88 4F01 A CARDIN: LI      R3,STATUS
924 0A89 0410 A      RIN      CARDR
925 0A8A      .IF
926 0A8A 6026 B OLCHK:  AND      R0,H0002
927 0A8B 1107 A      BOC      ZR0,$6
928 0A8C 8010 B      LD      R0,ACRDBUF      ;READ CARD STANDARD
929 0A8D 4F02 A      LI      R3,READ
930 0A8E 3281 A RCRD1: RCPY    R0,R2
931 0A8F 2D02 A      JSR@     RDCRD
932 0A90 21FE A      JMP      .-1
933 0A91 0200 A      RTS      0
934 0A92 7FD3 A RDCRD:  .WORD    07FD3
935 0A93      :
936 0A93      ; ERROR -- CARD READER OFFLINE, XMISSION ERROR, OR DATA OVERRUN
937 0A93      ;
938 0A93 4F06 A $6:    LI      R3,6
939 0A94 2C52 I      JSR      OUTMSG
940 0A95 0000 A      HALT
941 0A96 4F05 A      LI      R3,RESET
942 0A97 0610 A      ROUT     CARDR
943 0A98 21EF A      JMP      CARDIN
944 0A99      .IF      IMP16L

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945 0A99          .PAGE
946 0A99          ;*****
947 0A99          ;*
948 0A99          ;* IMP-16L TELETYPE CONTROL ROUTINES
949 0A99          ;*
950 0A99          ;*****
951 0A99          .LOCAL
952 0A99 A109 A   SAVE:   ST      R0,$R
953 0A9A A509 A       ST      R1,$R+1
954 0A9B A909 A       ST      R2,$R+2
955 0A9C AD09 A       ST      R3,$R+3
956 0A9D 0200 A       RTS
957 0A9E 8104 A   REST:   LD      R0,$R
958 0A9F 8504 A       LD      R1,$R+1
959 0AA0 8904 A       LD      R2,$R+2
960 0AA1 8D04 A       LD      R3,$R+3
961 0AA2 0200 A       RTS
962 0AA3          SRREG:
963 0AA3 0AA7 T   $R:      . = .+4

964 0AA7          .PAGE
965 0AA7          .LOCAL
966 0AA7 4F38 A   LTECHO: LI      R3,TTYAD      ;IMP-16L GET CHARACTER AND ECHO ROUTINE
967 0AA8 0A80 A       PFLG      2              ; PUT TTY ADDRESS IN R3
968 0AA9 0605 A       ROUT      5              ; RESET TTY
969 0AAA 4E08 A       LI        R2,8            ; SET COUNT TO 8
970 0AAB 0402 A       RIN       2              ; LOAD TTY DATA INTO R0(15)
971 0AAC 0604 A       ROUT      4              ; ENABLE TTY READER
972 0AAD 1201 A       BOC       2, .+2          ; TEST FOR START BIT
973 0AAE 21FC A       JMP       .-3
974 0AAF 4C09 A       LI        R0,EA          ; DELAY 1/2 BIT TIME
975 0AB0 03F6 A       JSRI      DELAY1
976 0AB1 58EA A       ROR       R0,EB          ; DELAY COMPENSATION
977 0AB2 0402 A       RIN       2              ; TEST IF START BIT IS STILL DOWN
978 0AB3 1201 A       BOC       2, .+2          ; BRANCH IF GOOD START
979 0AB4 21F3 A       JMP       LTECHO+1        ; FALSE START, RETURN
980 0AB5 0603 A   $14:  ROUT      3              ; SEND BIT TO PRINTER
981 0AB6 03F5 A       JSRI      DELAY          ; DELAY ONE BIT
982 0AB7 5826 A       ROL       R0,EC          ; DELAY COMPENSATION
983 0AB8 0402 A       RIN       2              ; LOAD DATA FROM TTY
984 0AB9 610D A       AND       R0,$M          ; MASK UNWANTED BITS
985 0ABA 5DFF A       SHR       R1,1
986 0ABB 3182 A       RXOR      R0,R1          ; ADD NEW BIT TO DATA
987 0ABC 4AFF A       AISZ      R2,-1          ; TEST IF DONE
988 0ABD 21F7 A       JMP       $14            ; NOT DONE, GET NEXT BIT
989 0ABE 0603 A       ROUT      3              ; SEND LAST DATA BIT
990 0ABF 03F5 A       JSRI      DELAY          ; WAIT INTO THE FIRST STOP BIT
991 0AC0 4CFF A       LI        R0,-1
992 0AC1 0603 A       ROUT      3              ; SEND STOP BIT
993 0AC2 03F5 A       JSRI      DELAY
994 0AC3 0605 A       ROUT      5
995 0AC4 5DF8 A       SHR       R1,8
996 0AC5 3481 A       RCPY      R1,R0          ; PUT DATA IN LSB OF R0
997 0AC6 0200 A       RTS
998 0AC7 80C0 A   $M:    .WORD    X'8000
999 0AC8 FFF5 A   DELAY  =        0FFF5
1000 0AC8 FFF6 A   DELAY1 =        0FFF6

1001 0AC8          .PAGE
1002 0AC8 4E09 A   LTTYT: LI      R2,9          ;TTY CHARACTER-TRANSMIT ROUTINE
1003 0AC9 0A80 A       PFLG      2
1004 0ACA 4C00 A       LI        R0,0
1005 0ACB 4F38 A       LI        R3,TTYAD
1006 0ACC 0603 A       ROUT      3
1007 0ACD 58FF A       ROR       R0,1
1008 0ACE 2100 A       JMP       $2

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GENLDR

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1009 OACF 03F5 A $2: JSRI DELAY
1010 OAD0 5829 A ROL R0,TA
1011 OAD1 4AFF A $3: AISZ R2,-1
1012 OAD2 2101 A JMP $5
1013 OAD3 2104 A JMP $7
1014 OAD4 59FF A $5: ROR R1,1
1015 OAD5 3481 A RCPY R1,R0
1016 OAD6 0603 A $6: ROUT 3
1017 OAD7 21F7 A JMP $2
1018 OAD8 4CFF A $7: LI R0,-1
1019 OAD9 0603 A ROUT 3
1020 OADA 03F5 A $8: JSRI DELAY
1021 OADB 03F5 A JSRI DELAY
1022 OADC 0200 A RTS
1023 OADD .ENDIF

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1024 OADD .PAGE
1025 OADD ;*****
1026 OADD ;*
1027 OADD ;* OUTPUT ANSI STRING TO TTY PRINTER
1028 OADD ;*
1029 OADD ;*****
1030 OADD .LOCAL
1031 OADD ;
1032 OADD ; ON ENTRY: R3 <-- ADDRESS OF STRING
1033 OADD ; R2 <-- # OF CHARACTERS IN STRING
1034 OADD ;
1035 OADD 8700 A OUTANS: LD R1,(R3)
1036 OADE 0826 B SUB R2,H0002
1037 OADF E825 B SKG R2,H0000
1038 OAE0 2103 A JMP $1
1039 OAE1 2918 A JSR OUTWD
1040 OAE2 4B01 A AISZ R3,1
1041 OAE3 21F9 A JMP OUTANS
1042 OAE4 C826 B $1: ADD R2,H0002
1043 OAE5 59F8 A ROR R1,8
1044 OAE6 3481 A RCPY R1,R0
1045 OAE7 2C5C I JSR OUTCH
1046 OAE8 4AFF A AISZ R2,-1
1047 OAE9 21FB A JMP -4
1048 OAEA 0200 A RTS 0

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1049 OAEB .PAGE
1050 OAEB ;*****
1051 OAEB ;*
1052 OAEB ;* OUTPUT HEXADECIMAL WORD TO TTY PRINTER
1053 OAEB ;*
1054 OAEB ;*****
1055 OAEB .LOCAL
1056 OAEB ;
1057 OAEB ; ON ENTRY: R1 <-- HEXADECIMAL WORD
1058 OAEB ;
1059 OAEB A90D A OUTHEX: ST R2,$R2
1060 OAE0 4E04 A LI R2,4
1061 OAE1 3481 A $1: RCPY R1,R0
1062 OAE2 5CF4 A SHR R0,12
1063 OAE3 5D04 A SHL R1,4
1064 OAE4 4830 A AISZ R0,030
1065 OAE5 E034 B SKG R0,H0039
1066 OAE6 2101 A JMP +2
1067 OAE7 4807 A AISZ R0,007
1068 OAE8 2C5C I JSR OUTCH
1069 OAE9 4AFF A AISZ R2,-1
1070 OAF0 21F6 A JMP $1
1071 OAF1 8901 A LD R2,$R2
1072 OAF2 0200 A RTS 0
1073 OAF3 0AFA T $R2: .=-. +1

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1074 0AFA                .PAGE
1075 0AFA                ;*****
1076 0AFA                ;*
1077 0AFA                ;* OUTPUT 2 ANSI CHARACTERS TO TELETYPE KEYBOARD
1078 0AFA                ;*
1079 0AFA                ;*****
1080 0AFA                .LOCAL
1081 0AFA                ;
1082 0AFA                ; ON ENTRY:      R1 <-- 2 ANSI CHARACTERS
1083 0AFA                ;
1084 0AFA 3481 A OUTWD:  RCPY      R1,R0
1085 0AFB 5CF8 A        SHR      R0,8
1086 0AFC 2C5C I        JSR      OUTCH
1087 0AFD 3481 A        RCPY      R1,R0
1088 0AFE 2C5C I        JSR      OUTCH
1089 0AFF 0200 A        RTS      0

```

```

1090 0B00                .PAGE
1091 0B00                ;*****
1092 0B00                ;*
1093 0B00                ;* OBTAIN HEXADECIMAL VALUE FROM INPUT COMMAND
1094 0B00                ;*
1095 0B00                ;*****
1096 0B00                .LOCAL
1097 0B00                ;
1098 0B00                ; INITIALIZE VALFLG AND VALCNT
1099 0B00                ;
1100 0B00 0B01 T $R2:      .=.+1
1101 0B01 4D00 A VALUE:  LI      R1,0
1102 0B02 A41A B        ST      R1,VALFLG
1103 0B03                ;
1104 0B03                ; IGNORE LEADING BLANKS
1105 0B03                ;
1106 0B03 A9FC A        ST      R2,$R2
1107 0B04 8816 B        LD      R2,START
1108 0B05 8200 A $1:      LD      R0,(R2)
1109 0B06 F02F B        SKNE    R0,H0020
1110 0B07 2101 A        JMP     .+2
1111 0B08 2107 A        JMP     $6
1112 0B09 4A01 A        AISZ    R2,1
1113 0B0A 21FA A        JMP     $1
1114 0B0B                ;
1115 0B0B                ; CHECK FOR VALID HEXADECIMAL CHARACTERS
1116 0B0B                ;
1117 0B0B 2C64 I $3:      JSR     ANSHEX
1118 0B0C 2108 A        JMP     $7
1119 0B0D 781A B        ISZ     VALFLG
1120 0B0E 4A01 A        AISZ    R2,1
1121 0B0F 8200 A        LD      R0,(R2)
1122 0B10                ;
1123 0B10                ; CHECK FOR BLANK OR EOR
1124 0B10                ;
1125 0B10 F02F B $6:      SKNE    R0,H0020
1126 0B11 2105 A        JMP     $8
1127 0B12 F041 B        SKNE    R0,H00FF
1128 0B13 2103 A        JMP     $8
1129 0B14 21F6 A        JMP     $3
1130 0B15                ;
1131 0B15                ; ERROR -- INVALID COMMAND (INVALID HEX CHARACTER)
1132 0B15                ;
1133 0B15 4400 A $7:      PULL    R0
1134 0B16 2465 I        JMP     INVCMD
1135 0B17                ;
1136 0B17                ; RETURN +0 IF NO VALUE, +1 IF LEGAL VALUE; ELSE INVALID COMMAND
1137 0B17                ;
1138 0B17 801A B $8:      LD      R0,VALFLG

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GENLDR

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1139 0B18 89E7 A      LD      R2,$R2
1140 0B19 1501 A      BNC     NZERO,.,+2
1141 0B1A 0200 A      RTS     0
1142 0B1B 3481 A      RCPY    R1,R0
1143 0B1C 0201 A      RTS     1

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```

1144 0B1D              .PAGE
1145 0B1D              ;*****
1146 0B1D              ;*
1147 0B1D              ;* PRINT SYMBOL TABLE ENTRY
1148 0B1D              ;*
1149 0B1D              ;*****
1150 0B1D              .LOCAL
1151 0B1D              ;
1152 0B1D              ; ON ENTRY:      R2 <-- ADDRESS OF SYMBOL TABLE ENTRY
1153 0B1D              ;
1154 0B1D A918 A PRSYMB: ST      R2,$T1
1155 0B1E 8443 B      LD      R1,H0D0A
1156 0B1F 29DA A      JSR     OUTWD
1157 0B20 3B81 A      RCPY    R2,R3
1158 0B21 4BFC A      AISZ    R3,-4
1159 0B22 4E06 A      LI      R2,6
1160 0B23 29B9 A      JSR     OUTANS
1161 0B24 8446 B      LD      R1,H2020
1162 0B25 29D4 A      JSR     OUTWD
1163 0B26 890F A      LD      R2,$T1
1164 0B27 8600 A      LD      R1,(R2)
1165 0B28 29C2 A      JSR     OUTHEX
1166 0B29 890C A      LD      R2,$T1
1167 0B2A 8446 B      LD      R1,H2020
1168 0B2B 29CE A      JSR     OUTWD
1169 0B2C 82FF A      LD      R0,-1(R2)
1170 0B2D 6048 B      AND     R0,HA000
1171 0B2E F047 B      SKNE    R0,H8000
1172 0B2F 0200 A      RTS     0
1173 0B30 8438 B      LD      R1,H004D
1174 0B31 1501 A      BOC     NZERO,.,+2
1175 0B32 8439 B      LD      R1,H0055
1176 0B33 3481 A      RCPY    R1,R0
1177 0B34 2C5C I      JSR     OUTCH
1178 0B35 0200 A      RTS     0
1179 0B36              ;
1180 0B36              ; TEMPORARY
1181 0B36              ;
1182 0B36 0000 A $T1:  .WORD    0

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1183 0B37              .PAGE
1184 0B37              ;*****
1185 0B37              ;*
1186 0B37              ;* PRINT LIMITS
1187 0B37              ;*
1188 0B37              ;*****
1189 0B37              .LOCAL
1190 0B37              ;
1191 0B37              ; ON ENTRY:      R2 <-- ADDRESS OF VECTOR
1192 0B37              ;
1193 0B37 0000 A $VLOC:  .WORD    0
1194 0B38 0000 A $CNTR:  .WORD    0
1195 0B39 A811 B PRLIMS: ST      R2,AVECT
1196 0B3A A9FC A      ST      R2,$VLOC
1197 0B3B 8443 B      LD      R1,H0D0A
1198 0B3C 29BD A      JSR     OUTWD
1199 0B3D 4CFC A      LI      R0,-4
1200 0B3E A1F9 A      ST      R0,$CNTR
1201 0B3F 8C20 B      LD      R3,BSEQ

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GENLDR

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1202 0B40 89F6 A $1:    LD      R2,$VLOC
1203 0B41 8606 A      LD      R1,BSLO(R2)
1204 0B42 F605 A      SKG      R1,BSHI(R2)
1205 0B43 2101 A      JMP      .+2
1206 0B44 2109 A      JMP      $2
1207 0B45 2919 A      JSR      $5
1208 0B46 89F0 A      LD      R2,$VLOC
1209 0B47 8606 A      LD      R1,BSLO(R2)
1210 0B48 29A2 A      JSR      OUTHEX
1211 0B49 8035 B      LD      R0,H003A
1212 0B4A 2C5C I      JSR      OUTCH
1213 0B4B 89EB A      LD      R2,$VLOC
1214 0B4C 8605 A      LD      R1,BSHI(R2)
1215 0B4D 299D A      JSR      OUTHEX
1216 0B4E 4802 A $2:    AISZ    R3,2
1217 0B4F 79E7 A      ISZ      $VLOC
1218 0B50 79E6 A      ISZ      $VLOC
1219 0B51 79E6 A      ISZ      $CNTR
1220 0B52 21ED A      JMP      $1
1221 0B53          ;
1222 0B53          ; PRINT ENTRY POINT
1223 0B53          ;
1224 0B53 8811 B $4:    LD      R2,AVECT
1225 0B54 8204 A      LD      R0,ENTPT(R2)
1226 0B55 1501 A      BOC      NZERO,+.2
1227 0B56 2105 A      JMP      $4A
1228 0B57 8C23 B      LD      R3,ENTEQ
1229 0B58 2906 A      JSR      $5
1230 0B59 8811 B      LD      R2,AVECT
1231 0B5A 8604 A      LD      R1,ENTPT(R2)
1232 0B5B 298F A      JSR      OUTHEX
1233 0B5C 8443 B $4A:   LD      R1,H0DOA      ;CR-LF
1234 0B5D 299C A      JSR      OUTWD
1235 0B5E 0200 A      RTS      0
1236 0B5F          ;
1237 0B5F          ; SUBROUTINE: PRINT BLANK, BLANK, C1, C2, C3, C4 (WHERE R3 --> C1)
1238 0B5F          ;
1239 0B5F 8446 B $5:    LD      R1,H2020
1240 0B60 2990 A      JSR      OUTWD
1241 0B61 4E04 A      LI       R2,4
1242 0B62 2C4F I      JSR      OUTANS
1243 0B63 4BFF A      AISZ    R3,-1
1244 0B64 0200 A      RTS      0
1245 0B65          ;
1246 0B65          ; SUBROUTINE: PRINT 9 BLANKS
1247 0B65          ;
1248 0B65 4E09 A $6:    LI       R2,9
1249 0B66 802F B      LD      R0,H0020
1250 0B67 2C5C I      JSR      OUTCH
1251 0B68 4AFF A      AISZ    R2,-1
1252 0B69 21FD A      JMP      .-2
1253 0B6A 0200 A      RTS      0

1254 0B6B          .PAGE
1255 0B6B          ;*****
1256 0B6B          ;*
1257 0B6B          ;* SIMULATE LOAD INSTRUCTION
1258 0B6B          ;*
1259 0B6B          ;*****
1260 0B6B          .LOCAL
1261 0B6B          ;
1262 0B6B          ; ON ENTRY:      R2 <-- ADDRESS OF WORD TO BE LOADED INTO R0
1263 0B6B          ;
1264 0B6B          .IF      GENL
1265 0B6B 4200 A LOAD:   PUSH    R2      ;. . . . .
1266 0B6C E804 B      SKG      R2,BSZ      ;IF NOT IN PBASE SECTOR, SKIP
1267 0B6D C903 A      ADD      R2,BSPT     ;LOAD FROM PSEUDO-BS

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GENLDR

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1268 0B6E 8200 A      LD      R0,(R2)
1269 0B6F 4600 A      PULL    R2
1270 0B70 0200 A      RTS      0
1271 0B71 0C43 T BSPT: .WORD    PBSEC          ;POINTER TO PSEUDO-BS
1272 0B72 0FC5 T LDEND: .WORD    GLDRE-1        ;END OF LOADER
1273 0B73              .ENDIF                  ;. . . . .

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1274 0B73              .PAGE
1275 0B73              ;*****
1276 0B73              ;*
1277 0B73              ;* SIMULATE STORE INSTRUCTION
1278 0B73              ;*
1279 0B73              ;*****
1280 0B73              .LOCAL
1281 0B73              ;
1282 0B73              ; ON ENTRY:   R2 <-- ADDRESS OF WORD TO BE STORED
1283 0B73              ;           R0 <-- WORD TO BE STORED
1284 0B73              ;
1285 0B73              .IF      GENL              ;. . . . .
1286 0B73 E9FE A STORE: SKG      R2,LDEND        ;END OF LOADER
1287 0B74 210A A      JMP      $2
1288 0B75 E81D B      SKG      R2,HICORE        ;UPPER LIMIT OF MEMORY
1289 0B76 2102 A      JMP      .+3
1290 0B77 2110 A      JMP      $3
1291 0B78 4700 A $1:   PULL     R3
1292 0B79 4200 A      PUSH     R2
1293 0B7A E804 B      SKG      R2,BSZ          ;IF NOT IN PBASE SECTOR, SKIP
1294 0B7B C9F5 A      ADD      R2,BSPT        ;STORE INTO PSEUDO-BS
1295 0B7C A200 A      ST       R0,(R2)
1296 0B7D 4600 A      PULL     R2
1297 0B7E 0200 A      RTS      0
1298 0B7F 4300 A $2:   PUSH     R3
1299 0B80 8C1F B      LD       R3,RLMVCT
1300 0B81 EB01 A      SKG      R2,STLO(R3)
1301 0B82 21F5 A      JMP      $1
1302 0B83 4F0F A      LI       R3,15          ;ILLEGAL AREA - SEND MESSAGE
1303 0B84 2909 A      JSR      OUTMSG         ;AND DO NOT PERFORM STORE
1304 0B85 0000 A      HALT
1305 0B86 4700 A      PULL     R3
1306 0B87 0200 A      RTS      0
1307 0B88 4300 A $3:   PUSH     R3
1308 0B89 4F10 A      LI       R3,16          ;EXCEEDED MEMORY SIZE - SEND MESSAGE
1309 0B8A 2903 A      JSR      OUTMSG         ;AND DO NOT PERFORM STORE
1310 0B8B 0000 A      HALT
1311 0B8C 4700 A      PULL     R3
1312 0B8D 0200 A      RTS      0
1313 0B8E              .ENDIF                  ;. . . . ., . . . . .

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1314 0B8E              .PAGE
1315 0B8E              ;*****
1316 0B8E              ;*
1317 0B8E              ;* OUTPUT MESSAGE TO TELETYPE PRINTER
1318 0B8E              ;*
1319 0B8E              ;**Q*****
1320 0B8E              .LOCAL
1321 0B8E              ;
1322 0B8E              ; ON ENTRY:   R3 <-- MESSAGE ADDRESS
1323 0B8E              ;
1324 0B8E 8443 B OUTMSG: LD       R1,HOD0A
1325 0B8F 2C4D I      JSR      OUTWD
1326 0B90 CC0F B      ADD      R3,ATBL4        ;CALCULATE BASE ADDR OF MESSAGE
1327 0B91 8F00 A      LD       R3,(R3)
1328 0B92 8700 A      LD       R1,(R3)
1329 0B93 2C4D I      JSR      OUTWD
1330 0B94 8701 A      LD       R1,1(R3)
1331 0B95 2C4D I      JSR      OUTWD
1332 0B96 0200 A      RTS      0

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1333 0B97      .PAGE
1334 0B97      ;*****
1335 0B97      ;*
1336 0B97      ;* MESSAGES AND MESSAGE SEGMENTS
1337 0B97      ;*
1338 0B97      ;*****

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1339 0B97      .SPACE 5
1340 0B97      .IF GENL
1341 0B97 4745 A MSG0: .ASCII 'GENERAL LOADER (REV.D) READY.'
      0B98 4E45 A
      0B99 5241 A
      0B9A 4C20 A
      0B9B 4C4F A
      0B9C 4144 A
      0B9D 4552 A
      0B9E 2028 A
      0B9F 5245 A
      0BA0 562E A
      0BA1 4429 A
      0BA2 2052 A
      0BA3 4541 A
      0BA4 4459 A
      0BA5 2E20 A
1342 0BA6      .ENDIF
1343 0BA6 434D A MSG1: .ASCII 'CMND'
      0BA7 4E44 A
1344 0BA8 454E A MSG3: .ASCII 'ENT '
      0BA9 5420 A
1345 0BAA 4348 A MSG5: .ASCII 'CHAR'
      0BAB 4152 A
1346 0BAC 504E A MSG6: .ASCII 'PNCH'
      0BAD 4348 A
1347 0BAE 4352 A MSG7: .ASCII 'CRDR'
      0BAF 4452 A
1348 0BB0 5345 A MSG11: .ASCII 'SEQ '
      0BB1 5120 A
1349 0BB2 4348 A MSG12: .ASCII 'CKSM'
      0BB3 534D A
1350 0BB4 4253 A MSG13: .ASCII 'BSOV'
      0BB5 4F56 A
1351 0BB6 5453 A MSG14: .ASCII 'TSOV'
      0BB7 4F56 A
1352 0BB8 5359 A MSG15: .ASCII 'SYMB'
      0BB9 4D42 A
1353 0B9A 4144 A MSG16: .ASCII 'ADDR'
      0BBB 4452 A
1354 0BBC 4558 A MSG17: .ASCII 'EXTN'
      0BBD 544E A
1355 0BBE 4152 A MSG18: .ASCII 'AREA'
      0BBF 4541 A
1356 0BC0 4D45 A MSG19: .ASCII 'MEM '
      0BC1 4D20 A
1357 0BC2 5359 A MSG20: .ASCII 'SYST'
      0BC3 5354 A
1358 0BC4 4E4D A MSG21: .ASCII 'NMBR'
      0BC5 4252 A
1359 0BC6 4452 A MSG22: .ASCII 'DROP'
      0BC7 4F50 A
1360 0BC8 5054 A MSG23: .ASCII 'PTCH';
      0BC9 4348 A
1361 0BCA 4253 A MS1: .ASCII 'BS ='
      0BCB 203D A
1362 0BCC 5453 A MS2: .ASCII 'TS ='
      0BCD 203D A

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; SEQUENCE NUMBER ERROR
; DROPPED CARD ERROR
PATCH CARD FOUND MESSAGE

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GENLDR

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1363 0BCE 4153 A MS3:  .ASCII  'AS ='
      OBCF 203D A
1364 0BD0 5054 A MS5:  .ASCII  'PTR='
      OBD1 523D A
1365 0BD2 454E A MS4:  .ASCII  'ENT='
      OBD3 543D A

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1366 0BD4          .PAGE
1367 0BD4          ;*****
1368 0BD4          ;*
1369 0BD4          ;* NON-BSECT DATA
1370 0BD4          ;*
1371 0BD4          ;*****

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1372 0BD4          .SPACE 5
1373 0BD4 0BE6 T INBUF:  .=.+18          ;PACKED BUFFER FOR RLM RECORD
1374 0BE6 0C36 T CROBUF:  .=.+80          ;UNPACKED BUFFER FOR CARD INPUT
1375 0C36 087F T VCT0:  .WORD  DSCLDR-1,DSCLDR-1,16,288,0,0,X'7FFF,0,X'7FFF
      0C37 087F T
      0C38 0010 A
      0C39 0120 A
      0C3A 0000 A
      0C3B 0000 A
      0C3C 7FFF A
      0C3D 0000 A
      0C3E 7FFF A
1376 0C3F 0000 A          .WORD  0,X'7FFF,0100,0100
      0C40 7FFF A
      0C41 0100 A
      0C42 0100 A
1377 0C43          .IF  GENL          :. . . . .
1378 0C43 0CAD T PBSEC:  .=.+106          ;PSEUDO-BASE SECTOR
1379 0CAD          .ENDIF          :. . . . .
1380 0CAD 087F T VCT1:  .WORD  DSCLDR-1,DSCLDR-1,16,288,0,0,X'7FFF,0,X'7FFF
      0CAE 087F T
      0CAF 0010 A
      0CB0 0120 A
      0CB1 0000 A
      0CB2 0000 A
      0CB3 7FFF A
      0CB4 0000 A
      0CB5 7FFF A
1381 0CB6 0000 A          .WORD  0,X'7FFF,0100,0100
      0CB7 7FFF A
      0CB8 0100 A
      0CB9 0100 A

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1382 0CBA          .PAGE
1383 0CBA          ;*****
1384 0CBA          ;*
1385 0CBA          ;* TABLE 2: STATE 1 COMMANDS
1386 0CBA          ;*
1387 0CBA          ;*****

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```

1388 0CBA          .SPACE 5
1389 0CBA 214F A TBL2:  .ASCII  ' OBS'
      0CBB 4253 A

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GENLDR

1390	OCBC	0880	T	.WORD	OBS
1391	OCBD	214F	A	.ASCII	'OTS'
	OCBE	5453	A		
1392	OCBF	0887	T	.WORD	OTS
1393	OCC0	2152	A	.ASCII	'RLM'
	OCC1	4C4D	A		
1394	OCC2	08F9	T	.WORD	RLM
1395	OCC3	2153	A	.ASCII	'SY'
	OCC4	5920	A		
1396	OCC5	08BF	T	.WORD	SY
1397	OCC6	2145	A	.ASCII	'ER'
	OCC7	5220	A		
1398	OCC8	08BC	T	.WORD	ER
1399	OCC9	2143	A	.ASCII	'CR'
	OCCA	5220	A		
1400	OCCB	08DD	T	.WORD	CR
1401	OCCE	2154	A	.ASCII	'TTY'
	OCCE	5459	A		
1402	OCCE	08DF	T	.WORD	TTY
1403	OCCE	2143	A	.ASCII	'CLR'
	OCDD	4C52	A		
1404	OCDD	08E2	T	.WORD	CLR
1405	OCDD	2147	A	.ASCII	'GO'
	OCDD	4F20	A		
1406	OCDD	0940	T	.WORD	GO
1407	OCDD	214C	A	.ASCII	'LM'
	OCDD	4D20	A		
1408	OCDD	08D5	T	.WORD	LM
1409	OCDD	214E	A	.ASCII	'NLM'
	OCDD	4C4D	A		
1410	OCDA	08D3	T	.WORD	NLM
1411	OCDB	2153	A	.ASCII	'SQ'
	OCDC	5120	A		
1412	OCDD	08DA	T	.WORD	SEQ
1413	OCDE	214E	A	.ASCII	'NSQ'
	OCDF	5351	A		
1414	OCE0	08D8	T	.WORD	NSEQ
1415	OCE1	5858	A	CMD2: .ASCII	'XXXX'
	OCE2	5858	A		
1416	OCE3	089F	T	.WORD	INVCMD

1417	OCE4		.PAGE	
1418	OCE4		*****	
1419	OCE4		;	*
1420	OCE4		;* TABLE 3: EBCDIC TO ANSI CONVERSION TABLE	*
1421	OCE4		;	*
1422	OCE4		*****	

1423	OCE4		.SPACE	5	
1424	OCE4	0000	A	TBL3: .WORD	0000 ;SPACE
1425	OCE5	0482	A	.WORD	0482; EXCLAMATION 11-2-8
1426	OCE6	0200	A	.WORD	0200; 0
1427	OCE7	0100	A	.WORD	0100; 1
1428	OCE8	0080	A	.WORD	0080; 2
1429	OCE9	0040	A	.WORD	0040; 3
1430	OCEA	0020	A	.WORD	0020; 4
1431	OCEB	0010	A	.WORD	0010; 5
1432	OCEC	0008	A	.WORD	0008; 6
1433	OCE0	0004	A	.WORD	0004; 7
1434	OCEE	0002	A	.WORD	0002; 8
1435	OCEF	0001	A	.WORD	0001; 9
1436	OCE0	0900	A	.WORD	0900; A 12-1

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1437	OCF1	0880	A	.WORD	0880;	B	12-2
1438	OCF2	0840	A	.WORD	0840;	C	12-3
1439	OCF3	0820	A	.WORD	0820;	D	12-4
1440	OCF4	0810	A	.WORD	0810;	E	12-5
1441	OCF5	0808	A	.WORD	0808;	F	12-6
1442	OCF6	0804	A	.WORD	0804;	G	12-7
1443	OCF7	0802	A	.WORD	0802;	H	12-8
1444	OCF8	0801	A	.WORD	0801;	I	12-9
1445	OCF9	0500	A	.WORD	0500;	J	11-1
1446	OCFA	0480	A	.WORD	0480;	K	11-2
1447	OCFB	0440	A	.WORD	0440;	L	11-3
1448	OCFC	0420	A	.WORD	0420;	M	11-4
1449	OCFD	0410	A	.WORD	0410;	N	11-5
1450	OCFE	0408	A	.WORD	0408;	O	11-6
1451	OCFF	0404	A	.WORD	0404;	P	11-7
1452	OD00	0402	A	.WORD	0402;	Q	11-8
1453	OD01	0401	A	.WORD	0401;	R	11-9
1454	OD02	0280	A	.WORD	0280;	S	0-2
1455	OD03	0240	A	.WORD	0240;	T	0-3
1456	OD04	0220	A	.WORD	0220;	U	0-4
1457	OD05	0210	A	.WORD	0210;	V	0-5
1458	OD06	0208	A	.WORD	0208;	W	0-6
1459	OD07	0204	A	.WORD	0204;	X	0-7
1460	OD08	0202	A	.WORD	0202;	Y	0-8
1461	OD09	0201	A	.WORD	0201;	Z	0-9

1462	OD0A			.PAGE			
1463	OD0A			*****			
1464	OD0A			;*			*
1465	OD0A			;* TABLE 4: ERROR MESSAGE ADDRESSES			*
1466	OD0A			;*			*
1467	OD0A			*****			

1468	OD0A			.SPACE	5		
1469	OD0A	0B97	T	TBL4: .WORD	MSG0		
1470	OD0B	0BA6	T	.WORD	MSG1		
1471	OD0C	0000	A	.WORD	0		
1472	OD0D			.ENDIF			-----
1473	OD0D	0BA8	T	.WORD	MSG3		
1474	OD0E	0BAA	T	.WORD	MSG5		
1475	OD0F	0BAC	T	.WORD	MSG6		
1476	OD10	0BAE	T	.WORD	MSG7		
1477	OD11	0000	A	.WORD	0		;THIS MESSAGE NOT APPLICABLE
1478	OD12			.ENDIF			-----
1479	OD12	0BB0	T	.WORD	MSG11		
1480	OD13	0BB2	T	.WORD	MSG12		
1481	OD14	0BB4	T	.WORD	MSG13		
1482	OD15	0BB6	T	.WORD	MSG14		
1483	OD16	0BB8	T	.WORD	MSG15		
1484	OD17	0BBA	T	.WORD	MSG16		
1485	OD18	0BBC	T	.WORD	MSG17		
1486	OD19	0BBE	T	.WORD	MSG18		
1487	OD1A	0BC0	T	.WORD	MSG19		
1488	OD1B	0BC2	T	.WORD	MSG20		
1489	OD1C	0BC4	T	.WORD	MSG21		
1490	OD1D	0BC6	T	.WORD	MSG22;	INDEX 19 NOT 22	
1491	OD1E	0BC8	T	.WORD	MSG23;	INDEX 20 NOT 23	

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1492 0D1F          .PAGE
1493 0D1F          ;*****
1494 0D1F          ;*
1495 0D1F          ;* BSECT VARIABLES
1496 0D1F          ;*
1497 0D1F          ;*****
1498 0D1F          .BSECT
1499 0000 0000 A LOW1: .WORD 0
1500 0001          .IF GENL
1501 0001 0000 A ENTY: .WORD 0
1502 0002 087F T HIGH1: .WORD 0
1503 0003 0FC6 T LOW2: .WORD 0
1504 0004 0069 A BSZ: .WORD 105
1505 0005          .ENDIF
1506 0005 3FFF A HIGH2: .WORD X'3FFF
1507 0006 0CE1 T ACMD2: .WORD CMD2
1508 0007 0BD4 T AINBUF: .WORD INBUF
1509 0008 0C35 T ENDBUF: .WORD CRDBUF+79
1510 0009 0000 A SEQCK: .WORD 0
1511 000A 0A79 T NUMB: .WORD NMBR-1
1512 000B 0000 A CRDFLG: .WORD 0
1513 000C 0CBA T ATBL2: .WORD TBL2
1514 000D 0CE4 T ATBL3: .WORD TBL3
1515 000E 0D09 T ETBL3: .WORD TBL3+37
1516 000F 0D0A T ATBL4: .WORD TBL4
1517 0010 0BE6 T ACRDBUF: .WORD CRDBUF
1518 0011 0000 A AVECT: .WORD 0
1519 0012 0000 A INDEVF: .WORD 0
1520 0013 0000 A LIMFLG: .WORD 0
1521 0014 0000 A PTRLO: .WORD 0
1522 0015 0000 A PTRHI: .WORD 0
1523 0016 0000 A START: .WORD 0
1524 0017 0000 A STATE: .WORD 0
1525 0018 0000 A STLOW: .WORD 0
1526 0019 0000 A VALCNT: .WORD 0
1527 001A 0000 A VALFLG: .WORD 0
1528 001B 0000 A WDCNT: .WORD 0
1529 001C 0000 A TEMP1: .WORD 0
1530 001D 3FFF A HICORE: .WORD 16383
1531 001E 0C36 T INVCT: .WORD VCT0
1532 001F 0CAD T RLMVCT: .WORD VCT1
1533 0020 0BCA T BSEQ: .WORD MS1
1534 0021 0BCC T TSEQ: .WORD MS2
1535 0022 0BCE T ASEQ: .WORD MS3
1536 0023 0BD2 T ENTEQ: .WORD MS4
1537 0024 0BD0 T PTREQ: .WORD MS5
1538 0025 0000 A H0000: .WORD 0000
1539 0026 0002 A H0002: .WORD 0002
1540 0027 0004 A H0004: .WORD 0004
1541 0028 0008 A H0008: .WORD 0008
1542 0029 0009 A H0009: .WORD X'9
1543 002A 000A A H000A: .WORD 000A
1544 002B 000D A H000D: .WORD 000D
1545 002C 0011 A H0011: .WORD 0011
1546 002D 0013 A H0013: .WORD 0013
1547 002E 001F A H001F: .WORD 001F
1548 002F 0020 A H0020: .WORD 0020
1549 0030 0021 A H0021: .WORD 0021
1550 0031 002F A H002F: .WORD 002F
1551 0032 0030 A H0030: .WORD 0030
1552 0033 0037 A H0037: .WORD 0037
1553 0034 0039 A H0039: .WORD 0039
1554 0035 003A A H003A: .WORD 003A
1555 0036 0040 A H0040: .WORD 0040
1556 0037 0046 A H0046: .WORD 0046
1557 0038 004D A H004D: .WORD 004D
1558 0039 0055 A H0055: .WORD 0055
1559 003A 0059 A H0059: .WORD 0059

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1560 003B 005F A H005F: .WORD 005F
1561 003C 007D A H007D: .WORD 007D
1562 003D 007E A H007E: .WORD 007E
1563 003E 007F A H007F: .WORD 007F
1564 003F 0080 A H0080: .WORD 0080
1565 0040 00C0 A H00C0: .WORD 00C0
1566 0041 00FF A H00FF: .WORD 00FF
1567 0042 0100 A H0100: .WORD 0100
1568 0043 0D0A A H0D0A: .WORD 0D0A
1569 0044 13FF A H13FF: .WORD X'13FF
1570 0045 1F00 A H1F00: .WORD X'1F00
1571 0046 2020 A H2020: .WORD X'2020
1572 0047 8000 A H8000: .WORD X'8000
1573 0048 A000 A HA000: .WORD X'A000
1574 0049 F000 A HF000: .WORD X'F000
1575 004A FF00 A HFF00: .WORD X'FF00
1576 004B FFEE A HFFEE: .WORD X'FFEE

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1577 004C .PAGE
1578 004C ;*****
1579 004C ;*
1580 004C ;* EQUATES
1581 004C ;*
1582 004C ;*****

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1583 004C .SPACE 5
1584 004C 0000 A R0 = 0
1585 004C 0001 A R1 = 1
1586 004C 0002 A R2 = 2
1587 004C 0003 A R3 = 3
1588 004C 0000 A M0 = 0
1589 004C 0001 A M1 = 1
1590 004C 0002 A M2 = 2
1591 004C 0003 A M3 = 3
1592 004C 0004 A M4 = 4
1593 004C 0005 A M5 = 5
1594 004C 0006 A M6 = 6
1595 004C 0007 A M7 = 7
1596 004C 0008 A M8 = 8
1597 004C 0009 A M9 = 9
1598 004C 000A A M10 = 10
1599 004C 0007 A ML = 7
1600 004C 0014 A LDMS1 = 20
1601 004C 0009 A LDMS2 = 9
1602 004C 000F A LDMS3 = 15
1603 004C 0009 A LDMS4 = 9
1604 004C 0000 A STHI = 0
1605 004C 0001 A STLO = 1
1606 004C 0002 A BSO = 2
1607 004C 0003 A TSO = 3
1608 004C 0004 A ENTPT = 4
1609 004C 0005 A BSHI = 5
1610 004C 0006 A BSLO = 6
1611 004C 0007 A TSHI = 7
1612 004C 0008 A TSLO = 8
1613 004C 0009 A ASHI = 9
1614 004C 000A A ASLO = 10
1615 004C 000B A PTRN = 11
1616 004C 000C A PTRP = 12
1617 004C 000D A LVCT = 13
1618 004C 0028 A LBST = 40

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1619 004C 0001 A ZRO = 1
1620 004C 0005 A NZERO = 5
1621 004C 000C A POA = 12
1622 004C 0001 A STATUS = 1
1623 004C 0002 A READ = 2
1624 004C 0003 A READCK = 3
1625 004C 0004 A SETADR = 4
1626 004C 0005 A RESET = 5
1627 004C 0007 A WRITE = 7
1628 004C 0008 A TTYPE = 1*8
1629 004C 0008 A PT = 1*8
1630 004C 0010 A CARDR = 2*8
1631 004C 0018 A DISC = 3*8
1632 004C 0018 A GPCS = 018
1633 004C .IF IMP16L
1634 004C ;
1635 004C ; IMP-16L TTY CONSTANTS
1636 004C ;
1637 004C 0029 A TA = 41
1638 004C 0012 A TB = 18
1639 004C 0070 A TC = 112
1640 004C 0009 A EA = 9
1641 004C 0016 A EB = 22
1642 004C 0026 A EC = 38
1643 004C 0038 A TTYAD = 7*8
1644 004C .ENDIF

1645 004C .PAGE ***** LODREC *****
1646 004C .TSECT
1647 0D1F ;
1648 0D1F ; LODREC IMP-16 OBJECT RECORD PROCESSOR
1649 0D1F ;
1650 0D1F .LOCAL
1651 0D1F ;
1652 0D1F ; RELOCATES AND LINK-EDITS A SINGLE OBJECT RECORD OF AN IMP-16
1653 0D1F ; RELOCATABLE LOAD MODULE(RLM). RECORD FORMATS ARE DESCRIBED IN
1654 0D1F ; APPENDIX A OF ASSEMBLER USERS MANUAL. MAY BE CALLED AS MANY
1655 0D1F ; TIMES AS NECESSARY TO PROCESS ONE OR MORE RLM'S.
1656 0D1F ;
1657 0D1F 2112 A LODREC: JMP LDR1
1658 0D20 ;
1659 0D20 ; JUMP CONDITIONS
1660 0D20 0002 A PZRO = 2
1661 0D20 0003 A ODD = 3
1662 0D20 0004 A BIT1 = 4
1663 0D20 000B A NZRO = 11
1664 0D20 0005 A NEZ = 5
1665 0D20 ;
1666 0D20 ; OUTPUT VECTOR CONTENTS
1667 0D20 ;
1668 0D20 0000 A SYMTO=0 ;TOP LIMIT OF SYMBOL TABLE
1669 0D20 0001 A SYMBO=1 ;BOTTOM LIMIT OF SYMBOL TABLE
1670 0D20 0002 A BSLOC=2 ;BASE SECTOR ORIGIN
1671 0D20 0003 A TSLOC=3 ;TOP SECTOR ORIGIN
1672 0D20 0004 A ENTRY=4
1673 0D20 0005 A HIBAS=5
1674 0D20 0006 A LOBAS=6
1675 0D20 0007 A HITOP=7
1676 0D20 0008 A LOTOP=8
1677 0D20 0009 A HIABS=9
1678 0D20 000A A LOABS=10
1679 0D20 000B A INDC=11
1680 0D20 000C A PBOT=12 ;BOTTOM POINTER ADDRESS
1681 0D20 ;
1682 0D20 0012 A MRCDL=18 ;MAXIMUM INPUT RECORD LENGTH
1683 0D20 0048 A ORCDL=72

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1684	0D20	000C	A	VECL=12	
1685	0D20		;		
1686	0D20		;	PROGRAM EXITS	
1687	0D20		;		
1688	0D20	0000	A	ERR=0	;ERROR
1689	0D20	0001	A	TITLE=1	;TITLE RECORD PROCESSED
1690	0D20	0002	A	EOM=2	;END OF RLM
1691	0D20	0003	A	NRML=3	;NORMAL
1692	0D20		;		
1693	0D20		;	ERROR CODES	
1694	0D20		;		
1695	0D20	0001	A	RSEQ=1	;RECORD SEQUENCE
1696	0D20	0002	A	CKSUM=2	;CHECKSUM
1697	0D20	0003	A	BSOV=3	;BASE SECTOR OVERFLOW
1698	0D20	0004	A	TSOV=4	;TOP SECTOR OVERFLOW
1699	0D20	0005	A	SYMOV=5	;SYMBOL TABLE OVERFLOW
1700	0D20	0006	A	ADDR=6	;ADDRESSING
1701	0D20	0007	A	XREF=7	;REF NBR OF EXTERNAL NOT FOUND
1702	0D20				;IN SYMBOL TABLE
1703	0D20	0008	A	AREA=8	;LOADING IN ILLEGAL AREA
1704	0D20	0009	A	CORE=9	;EXCEEDED CORE SIZE
1705	0D20	000A	A	SYST=10	;SYSTEM MALFUNCTION
1706	0D20			.PAGE	
1707	0D20		;		
1708	0D20		;	INPUT RECORD FORMAT	
1709	0D20		;		
1710	0D20	0000	A	RCDL=0	;RECORD TYPE AND LENGTH
1711	0D20	0001	A	CKSM=1	;CHECKSUM
1712	0D20		;		
1713	0D20		;	FOR TITLE RECORD	
1714	0D20		;		
1715	0D20	0002	A	BSSIZ=2	;BASE SECTOR SIZE
1716	0D20	0003	A	TSSIZ=3	;TOP SECTOR SIZE
1717	0D20	0004	A	PNAM=4	;PROGRAM NAME - 3 WORDS
1718	0D20	0007	A	QCSTR=7	;QUAL. CHAR. STRING - 11 WORDS
1719	0D20		;		
1720	0D20		;	FOR SYMBOL RECORD	
1721	0D20		;		
1722	0D20	0002	A	SRELOC=2	;RELOCATION DATA
1723	0D20	0003	A	SYM1=3	;NAME OF SYMBOL 1
1724	0D20	0006	A	VAL1=6	;VALUE OF SYMBOL 1
1725	0D20	0007	A	SYM2=7	;NAME OF SYMBOL 2
1726	0D20	000A	A	VAL2=10	;VALUE OF SYMBOL 2
1727	0D20	000B	A	SYM3=11	;NAME OF SYMBOL 3
1728	0D20	000E	A	VAL3=14	;VALUE OF SYMBOL 3
1729	0D20		;		
1730	0D20		;	FOR DATA RECORD	
1731	0D20		;		
1732	0D20	0002	A	ILATYP=2	;LOAD ADDRESS RELOCATION TYPE
1733	0D20	0003	A	ILA=3	;LOAD ADDRESS
1734	0D20	0004	A	DTYP1=4	;DATA RELOC WORD 1
1735	0D20	0005	A	DTYP2=5	;DATA RELOC WORD 2
1736	0D20	0006	A	DATA=6	;DATA
1737	0D20		;		
1738	0D20		;	FOR END RECORD	
1739	0D20		;		
1740	0D20	0002	A	ENTYP=2	;ENTRY ADDRESS RELOCATION TYPE
1741	0D20	0003	A	ENTYAD=3	;ENTRY ADDRESS
1742	0D20		;		
1743	0D20		;		
1744	0D20		;	SYMBOL TYPES - RELOCATION INFO	
1745	0D20		;		
1746	0D20	0D2B	T	ABS=D0	
1747	0D20	0E29	T	EXT=D3	

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1748 0D20          .PAGE
1749 0D20          ;
1750 0D20          ;      SYMBOL TABLE ENTRY FORMAT
1751 0D20          ;
1752 0D20 FFFC A      NAM1=-4          ;CHARS 1 AND 2 OF SYMBOL TAG
1753 0D20 FFFD A      NAM2=-3          ;CHARS 3 AND 4 OF SYMBOL TAG
1754 0D20 FFFE A      NAM3=-2          ;CHARS 5 AND 6 OF SYMBOL TAG
1755 0D20 FFFF A      REFNR=-1         ;EXT. REFERENCE NUMBER (BITS 8-15)
1756 0D20 FFFF A      FLAGS=-1         ;FLAGS (BITS 0-7)
1757 0D20          ;
1758 0D20          ;      BIT 0   DEFINED
1759 0D20          ;      BIT 1   INDIRECT PNTR GENERATED
1760 0D20          ;      BIT 2   SYMBOL MULTIPLY DEFINED
1761 0D20 0000 A      RCHAIN=0          ;CHAIN OF UNRESOLVED REFERENCES (BIT 0=0)
1762 0D20 0000 A      VALU=0           ;SYMBOL ADDRESS (BIT0=1)
1763 0D20 0005 A      SYMNWE=5         ;NBR OF WORDS PER ENTRY IN SYMB TABLE
1764 0D20          ;
1765 0D20          ;      LOCAL VARIABLES
1766 0D20          ;
1767 0D20          ;      RECORD TYPE OF RECORD BEING PROCESSED
1768 0D20 0D21 T RTYP:  .=.+1
1769 0D21          ;      CURRENT LOADER STATE
1770 0D21 0000 A LSTATE: .WORD 0
1771 0D22          ;      TEMPORARY WORKING LOCATIONS
1772 0D22 0D23 T TEMP:  .=.+1
1773 0D23 0D24 T TEMP2: .=.+1
1774 0D24 0D25 T TEMP3: .=.+1
1775 0D25          ;
1776 0D25          ;      COMMON DATA AREA
1777 0D25          ;
1778 0D25 0D25 T BASE:  .WORD 0          ;BASE ADDRESS
1779 0D26 0D27 T BSMAX: .=.+1          ;BASE SECTOR EXTENT FOR CURRENT RLM
1780 0D27 0D28 T TSMAX: .=.+1          ;TOP SECTOR EXTENT FOR CURRENT RLM
1781 0D28          ;      NEXT AVAILABLE SLOT FOR INDIRECT POINTER
1782 0D28 00FF A BOTEXT: .WORD 255
1783 0D29          ;      LAST AVAILABLE SLOT FOR INDIRECT POINTER
1784 0D29 0000 A EXTLIM: .WORD 0
1785 0D2A 0E2C T $RLADD: .WORD RLTH
1786 0D2B          ;
1787 0D2B          ;      CONSTANTS
1788 0D2B          ;
1789 0D2B 0000 A D0:     .WORD 0
1790 0D2C 0003 A $D3:    .WORD 3
1791 0D2D 0004 A $D4:    .WORD 4
1792 0D2E 0008 A $D8:    .WORD 8
1793 0D2F 001E A D30:    .WORD 30
1794 0D30 0100 A D256:   .WORD 256
1795 0D31 2020 A $BLANKS: .ASCII ' '

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1796 0D32          .PAGE
1797 0D32          ;
1798 0D32          ;      INITIAL RECORD PROCESSING
1799 0D32          ;
1800 0D32 A147 A LDR1:  ST      R0,$SVR0          ;SAVE
1801 0D33 A547 A      ST      R1,$SVR1
1802 0D34 A947 A      ST      R2,$SVR2
1803 0D35 AD47 A      ST      R3,$SVR3
1804 0D36 89EE A      LD      R2,BASE          ;SAVE BASE ADDRESS OF COMMON AREA
1805 0D37 4200 A      PUSH    R2
1806 0D38 8967 A      LD      R2,INLOC          ;LOC OF INPUT BUFFER
1807 0D39 8200 A      LD      R0,RCDL(R2)      ;SPLIT RECORD LENGTH AND TYPE
1808 0D3A 5C02 A      SHL     R0,2
1809 0D3B 5CFE A      SHR     R0,2
1810 0D3C B1ED A      ST      R0,@$RLADD
1811 0D3D 8200 A      LD      R0,RCDL(R2)
1812 0D3E 5802 A      ROL     R0,2
1813 0D3F 61EC A      AND     R0,$D3

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1814 0D40 A1DF A      ST      R0,RTYP
1815 0D41 895E A      LD      R2,INLOC      ;CHECK RECORD CHECKSUM
1816 0D42 91E7 A      LD      R0,@$RLADD
1817 0D43 A1DE A      ST      R0,TEMP
1818 0D44 8201 A      LD      R0,CKSM(R2)
1819 0D45 110B A      BOC      ZR0,$25A      ;IGNORE CHECKSUM
1820 0D46 C9DB A      ADD      R2,TEMP      ;TEMP CONTAINS RECORD LENGTH
1821 0D47 4A01 A      AISZ     R2,1
1822 0D48 D200 A $25:  SUB      R0,(R2)
1823 0D49 4AFF A      AISZ     R2,-1
1824 0D4A 7DD7 A      DSZ      TEMP
1825 0D4B 21FC A      JMP      $25
1826 0D4C 1501 A      BOC      NEZ,+.2      ;CHECKSUM ERROR
1827 0D4D 2103 A      JMP      $25A
1828 0D4E 4F02 A      LI       R3,CKSUM      ;CHECKSUM ERROR
1829 0D4F 4400 A      PULL     R0
1830 0D50 0200 A      RTS      ERR
1831 0D51 89CF A $25A: LD      R2,LSTATE      ;TEST RECORD SEQUENCE
1832 0D52 81CD A      LD      R0,RTYP
1833 0D53 2922 A      JSR      SWITCH
1834 0D54 0D57 T      .WORD    $10      ; STATE 0
1835 0D55 0D5B T      .WORD    $12      ; STATE 1
1836 0D56 0D61 T      .WORD    $14      ; STATE 2
1837 0D57 1110 A $10:  BOC      ZR0,$21      ;TITLE RECORD LEGAL
1838 0D58 4F01 A $11:  LI       R3,RSEQ      ;RECORD SEQUENCE ERROR
1839 0D59 4400 A      PULL     R0
1840 0D5A 0200 A      RTS      ERR
1841 0D5B 3281 A $12:  RCPY     R0,R2
1842 0D5C 2919 A      JSR      SWITCH
1843 0D5D 0D58 T      .WORD    $11      ; TITLE RECORD - ERROR
1844 0D5E 0D6C T      .WORD    $23      ; CONTINUE SAME STATE
1845 0D5F 0D6A T      .WORD    $22      ; CHANGE TO STATE 2
1846 0D60 0D66 T      .WORD    $20      ; CHANGE TO STATE 0
1847 0D61 48FE A $14:  AISZ     R0,-2
1848 0D62 2101 A      JMP      .+2
1849 0D63 2108 A      JMP      $23      ; NO CHANGE OF STATE
1850 0D64 1201 A      BOC      PZR0,$20      ;END RECORD - CHANGE TO STATE 0
1851 0D65 21F2 A      JMP      $11      ;RECORD SEQUENCE ERROR
1852 0D66 4C00 A $20:  LI       R0,0      ;SET STATE 0
1853 0D67 2105 A      JMP      $24
1854 0D68 4C01 A $21:  LI       R0,1      ;SET STATE 1
1855 0D69 2103 A      JMP      $24
1856 0D6A 4C02 A $22:  LI       R0,2      ;SET STATE 2
1857 0D6B 2101 A      JMP      $24
1858 0D6C 81B4 A $23:  LD      R0,LSTATE      ;RETAIN CURRENT STATE
1859 0D6D A1B3 A $24:  ST      R0,LSTATE
1860 0D6E 89B1 A      LD      R2,RTYP
1861 0D6F 3881 A      RCPY     R2,R0      ;RECORD RELOC TYPE
1862 0D70 852F A      LD      R1,INLOC      ;PASS TO 'DATA REC PROCESSOR'
1863 0D71 2904 A      JSR      SWITCH
1864 0D72 0D7E T      .WORD    $TITL      ; TITLE RECORD
1865 0D73 0DA3 T      .WORD    $SYMB      ; SYMBOL RECORD
1866 0D74 0E3F T      .WORD    $DAT      ; DATA RECORD
1867 0D75 0F70 T      .WORD    $END      ; END RECORD
1868 0D76      ;
1869 0D76      ;      JUMP      TO CALL+1+(R2)
1870 0D76      ;
1871 0D76 5400 A SWITCH: XCHRS  R0
1872 0D77 3200 A      RADD     R0,R2
1873 0D78 4400 A      PULL     R0
1874 0D79 2600 A      JMP      @ (R2)
1875 0D7A      ;
1876 0D7A 0D7B T $SVR0:  .=. +1      ;REGISTER SAVE AREA
1877 0D7B 0D7C T $SVR1:  .=. +1
1878 0D7C 0D7D T $SVR2:  .=. +1
1879 0D7D 0D7E T $SVR3:  .=. +1

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1880 0D7E          .PAGE
1881 0D7E          ;
1882 0D7E          ; PROCESS TITLE RECORD
1883 0D7E          ;
1884 0D7E 8302 A $TITL: LD      RO,BSLOC(R3)      ;R3 CONTAINS PARAM VECTOR ADDRESS
1885 0D7F E306 A      SKG      RO,LOBAS(R3)      ;TEST B/S ORIGIN AGAINST LIMIT
1886 0D80 A306 A      ST        RO,LOBAS(R3)
1887 0D81 8308 A      LD        RO,INDC(R3)      ;INITIALIZE IND POINTER START ADDR
1888 0D82 A1A5 A      ST        RO,BOTEXT
1889 0D83 8705 A      LD        R1,HIBAS(R3)
1890 0D84 F041 B      SKNE      RO,HOOFF        ;HAS PNTR ADDR BEEN RESET?
1891 0D85 A5A3 A      ST        R1,EXTLIM        ;YES, RESET LIMIT VALUE
1892 0D86 8919 A      LD        R2,INLOC
1893 0D87 8302 A      LD        RO,BSLOC(R3)
1894 0D88 C202 A      ADD        RO,BSSIZ(R2)      ;CHECK BSECT SPACE REQUIRED
1895 0D89 C15A A      ADD        RO,MIN1
1896 0D8A 4600 A      PULL      R2                ;BASE ADDRESS OF COMMON AREA
1897 0D8B A201 A      ST        RO,BSMAX-BASE(R2)
1898 0D8C E305 A      SKG      RO,HIBAS(R3)
1899 0D8D 2105 A      JMP        $36                ;ENOUGH SPACE AVAILABLE
1900 0D8E E203 A      SKG      RO,BOTEXT-BASE(R2) ;CHECK INDIR. POINTER AREA
1901 0D8F 2102 A      JMP        $34                ;SPACE AVAILABLE - RESET HIBAS
1902 0D90 4F03 A      LI        R3,BSOV          ;BSECT OVERFLOW
1903 0D91 0200 A      RTS        ERR
1904 0D92 A305 A $34:  ST        RO,HIBAS(R3)
1905 0D93 8303 A $36:  LD        RO,TSLOC(R3)      ;CHECK TSECT SPACE REQUIRED
1906 0D94 E308 A      SKG      RO,LOTOP(R3)      ;TEST T/S ORIGIN AGAINST LIMIT
1907 0D95 A308 A      ST        RO,LOTOP(R3)
1908 0D96 4200 A      PUSH      R2
1909 0D97 8908 A      LD        R2,INLOC
1910 0D98 C203 A      ADD        RO,TSSIZ(R2)
1911 0D99 C14A A      ADD        RO,MIN1
1912 0D9A 4600 A      PULL      R2
1913 0D9B A202 A      ST        RO,TSMAX-BASE(R2) ;INITIALIZE FOR THIS RLM
1914 0D9C E307 A      SKG      RO,HITOP(R3)
1915 0D9D 2101 A      JMP        $40                ;ENOUGH SPACE AVAILABLE
1916 0D9E A307 A $38:  ST        RO,HITOP(R3)
1917 0D9F 0201 A $40:  RTS        TITLE

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1918 0DA0          .PAGE
1919 0DA0          ;
1920 0DA0          ; PROCESS SYMBOL RECORD
1921 0DA0          ;
1922 0DA0 08D4 T INLOC: .WORD    INBUF
1923 0DA1 0000 A RELTYP: .WORD    0
1924 0DA2 2000 A BIT2:   .WORD    X'2000
1925 0DA3 89FC A $SYMB: LD      R2,INLOC
1926 0DA4 A93C A      ST        R2,SYMN0          ;SYMBOL INDEX
1927 0DA5 9184 A      LD        RO,@$RLADD
1928 0DA6 3800 A      RADD      R2,RO
1929 0DA7 48FE A      AISZ      RO,-2
1930 0DA8 A13A A      ST        RO,INLIM
1931 0DA9 8202 A      LD        RO,SRELOC(R2)
1932 0DAA A1F6 A      ST        RO,RELTYP
1933 0DAB 8203 A $45:  LD        RO,SYM1(R2)
1934 0DAC 1126 A      BOC      ZRO,$63          ;RECORD DONE
1935 0DAD A137 A      ST        RO,SYMN1
1936 0DAE 8204 A      LD        RO,SYM1+1(R2)
1937 0DAF A136 A      ST        RO,SYMN2
1938 0DB0 8205 A      LD        RO,SYM1+2(R2)
1939 0DB1 A135 A      ST        RO,SYMN3
1940 0DB2 85EE A      LD        R1,RELTYP        ;RELOCATION TYPE
1941 0DB3 5902 A      ROL      R1,2
1942 0DB4 A5EC A      ST        R1,RELTYP
1943 0DB5 6573 A      AND      R1,D3
1944 0DB6 293F A      JSR      SEARCH          ;SEARCH SYMBOL TABLE
1945 0DB7 210E A      JMP      $48          ;SYMBOL TABLE OVERFLOW

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1946 ODB8 2110 A      JMP      $55          ;SYMBOL NOT FOUND
1947 ODB9 E53A A      SKG       R1,$TSREL    ;SYMBOL FOUND
1948 ODBA 2105 A      JMP      $47          ;SYMBOL NOT EXTERNAL
1949 ODBB 8D25 A $46:  LD        R3,SYMNO
1950 ODBC 8306 A      LD        R0,VAL1(R3)
1951 ODBD 6AFF A      OR        R0,REFNR(R2) ;REDUCE TO 8 BITS ONLY
1952 ODBE A2FF A      ST        R0,REFNR(R2) ;SET REFNR=NEW SYMB REF NR
1953 ODBF 210D A      JMP      $60
1954 ODC0 82FF A $47:  LD        R0,FLAGS(R2)
1955 ODC1 1213 A      BOC       PZRO,$65    ;EXISTING SYMBOL EXTERNAL
1956 ODC2 86FF A      LD        R1,FLAGS(R2) ;MARK SYMBOL MULTIPLY DEFINED
1957 ODC3 6DDE A      OR        R1,BIT2
1958 ODC4 A6FF A      ST        R1,FLAGS(R2)
1959 ODC5 2107 A      JMP      $60          ;FINISHED THIS SYMBOL
1960 ODC6 4F05 A $48:  LI        R3,SYMOV    ;SYMBOL TABLE OVERFLOW
1961 ODC7 4400 A      PULL      R0
1962 ODC8 0200 A      RTS       ERR
1963 ODC9          ;      SYMBOL NOT FOUND
1964 ODC9 F55F A $55:  SKNE     R1,EXT
1965 ODCA 21F0 A      JMP      $46          ;NEW SYMBOL IS EXTERNAL
1966 ODCB 291D A      JSR       SYMBOL      ;MARK SYMBOL DEFINED AND CALCULATE
1967 ODCC          ;      VALUE
1968 ODCC A200 A      ST        R0,VALU(R2)
1969 ODCD 8DAF A $60:  LD        R3,$SVR3
1970 ODCE          ;      CHECK FOR END OF RECORD
1971 ODCE 8912 A      LD        R2,SYMNO
1972 ODCF 4A04 A      AISZ     R2,4
1973 ODD0 A910 A      ST        R2,SYMNO
1974 ODD1 E911 A      SKG       R2,INLIM    ;ALL SYMBOLS PROCESSED ?
1975 ODD2 21D8 A      JMP      $45          ;NOT DONE WITH RECORD
1976 ODD3 4400 A $63:  PULL      R0
1977 ODD4 0203 A      RTS       NRML
1978 ODD5 2913 A $65:  JSR       SYMBOL      ;MARK SYMBOL DEFINED AND CALCULATE
1979 ODD6          ;      VALUE
1980 ODD6 8600 A      LD        R1,RCHAIN(R2)
1981 ODD7 A200 A      ST        R0,RCHAIN(R2)
1982 ODD8 F50B A $66:  SKNE     R1,MIN1    ;TEST FOR END OF CHAIN
1983 ODD9 21F3 A      JMP      $60          ;END
1984 ODDA 4000 A      PUSH     R0
1985 ODDR 3681 A      RCPY     R1,R2
1986 ODDC 2C66 I      JSR      LOAD
1987 ODDD 3181 A      RCPY     R0,R1
1988 ODD E 4400 A      PULL     R0
1989 ODDF 2C55 I      JSR      STORE
1990 ODE0 21F7 A      JMP      $66
1991 ODE1 0000 A SYMN0: .WORD    0          ;INDEX INTO SYMBOL RECORD
1992 ODE2 0000 A $R3:  .WORD    0          ;TEMP SAVE FOR R3
1993 ODE3 0BDF T INLIM: .WORD    INBUF+11
1994 ODE4 FFFF A MIN1:  .WORD    -1        ;END OF REFERENCE CHAIN
1995 ODE5 0000 A SYMN1: .WORD    0
1996 ODE6 0000 A SYMN2: .WORD    0
1997 ODE7 0000 A SYMN3: .WORD    0

1998 ODE8          .PAGE
1999 ODE8          ;
2000 ODE8          ;      SYMBOL - MARK SYMBOL DEFINED AND CALCULATE VALUE
2001 ODE8          ;
2002 ODE8 8000 A BIT0:  .WORD    X*8000    ;SYMBOL DEFINED BIT
2003 ODE9 82FF A SYMBOL: LD      R0,FLAGS(R2) ;MARK SYMBOL DEFINED
2004 ODEA 69FD A      OR       R0,BIT0
2005 ODEB A2FF A      ST        R0,FLAGS(R2)
2006 ODEC 4C00 A      LI        R0,0        ;CALCULATE VALUE FOR SYMBOL
2007 ODED F506 A      SKNE     R1,$TSREL
2008 ODEE 8303 A      LD        R0,TSLOC(R3) ;SYMBOL IS TSECT RELOCATABLE
2009 ODEF F505 A      SKNE     R1,$BSREL
2010 ODF0 8302 A      LD        R0,BSLOC(R3) ;SYMBOL IS BSECT RELOCATABLE

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2011 0DF1 8DEF A      LD      R3,SYMN0      ;CURRENT SYMBOL NUMBER
2012 0DF2 C306 A      ADD      R0,VAL1(R3)
2013 0DF3 0200 A      RTS
2014 0DF4 0002 A $TSREL: .WORD 2
2015 0DF5 0001 A $BSREL: .WORD 1

2016 0DF6              .PAGE
2017 0DF6              ;
2018 0DF6              ; SEARCH - SEARCH SYMBOL TABLE FOR MATCH. IF NO MATCH FOUND,
2019 0DF6              ; MAKE NEW ENTRY.
2020 0DF6              ;
2021 0DF6              ; INPUT SYMBOL NAME IN SYMN1,SYMN2,SYMN3. RETURNS ARE:
2022 0DF6              ;
2023 0DF6              ; CALL+1 SYMBOL TABLE OVERFLOW
2024 0DF6              ; CALL+2 SYMBOL NOT FOUND - NEW ENTRY
2025 0DF6              ; CALL+3 SYMBOL FOUND
2026 0DF6              ;
2027 0DF6 8B00 A SEARCH: LD      R2,SYMTOP(R3)
2028 0DF7 FB01 A      SKNE     R2,SYMBOT(R3) ;ANY ENTRIES IN TABLE?
2029 0DF8 210F A      JMP      $NOFND        ;NO
2030 0DF9 82FC A $TOP:  LD      R0,NAM1(R2)   ;COMPARE SYMBOL NAMES
2031 0DFA F1EA A      SKNE     R0,SYMN1
2032 0DFB 2101 A      JMP      .+2
2033 0DFC 2107 A      JMP      $OUT          ;NO MATCH
2034 0DFD 82FD A      LD      R0,NAM2(R2)
2035 0DFE F1E7 A      SKNE     R0,SYMN2
2036 0DFF 2101 A      JMP      .+2
2037 0E00 2103 A      JMP      $OUT          ;NO MATCH
2038 0E01 82FE A      LD      R0,NAM3(R2)
2039 0E02 F1E4 A      SKNE     R0,SYMN3
2040 0E03 0202 A      RTS 2                ;TAKE 'SYMBOL MATCH' RETURN
2041 0E04 4AFB A $OUT:  AISZ     R2,-SYMNWE   ;CURRENT ENTRY DOES NOT MATCH
2042 0E05 FB01 A      SKG      R2,SYMBOT(R3) ;ARE WE DONE?
2043 0E06 2101 A      JMP      $NOFND        ;YES - SYMBOL NOT FOUND
2044 0E07 21F1 A      JMP      $TOP          ;NOT DONE
2045 0E08 4AFB A $NOFND: AISZ     R2,-SYMNWE   ;DO WE HAVE SPACE FOR NEW ENTRY
2046 0E09 E92F A      SKG      R2,SYMLIM
2047 0E0A 0200 A      RTS 0                ;SYMBOL TABLE OVERFLOW
2048 0E0B AB01 A      ST       R2,SYMBOT(R3) ;YES - MAKE NEW ENTRY
2049 0E0C 4A05 A      AISZ     R2,SYMNWE
2050 0E0D 81D7 A      LD      R0,SYMN1
2051 0E0E A2FC A      ST       R0,NAM1(R2)
2052 0E0F 81D6 A      LD      R0,SYMN2
2053 0E10 A2FD A      ST       R0,NAM2(R2)
2054 0E11 81D5 A      LD      R0,SYMN3
2055 0E12 A2FE A      ST       R0,NAM3(R2)
2056 0E13 4C00 A      LI      R0,0
2057 0E14 A2FF A      ST       R0,REFNR(R2)
2058 0E15 4CFF A      LI      R0,-1          ;END OF CHAIN
2059 0E16 A200 A      ST       R0,RCHAIN(R2)
2060 0E17 0201 A      RTS 1                ;NO MATCH - NEW ENTRY MADE

2061 0E18              .PAGE
2062 0E18              ;
2063 0E18              ; UNPACK RELOCATION FIELDS IN DATA RECORD INTO INDIVIDUAL
2064 0E18              ; WORDS. R0 CONTAINS FIELDS TO BE UNPACKED. CALLING SEQUENCE:
2065 0E18              ;
2066 0E18              ; JSR UNPAK
2067 0E18              ; (NUMBER OF FIELDS)
2068 0E18              ; (DESTINATION)
2069 0E18              ; (NORMAL RETURN)
2070 0E18              ;
2071 0E18 4600 A UNPAK: PULL     R2                ;PICK UP INPUT PARAMETERS
2072 0E19 4200 A      PUSH     R2
2073 0F1A 8600 A      LD      R1,(R2)

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2074 0E1B A50B A      ST      R1,$CNT
2075 0E1C 8A01 A      LD       R2,1(R2)
2076 0E1D A10A A      ST      R0,$FLD
2077 0E1E 8109 A $1:   LD       R0,$FLD
2078 0E1F 5802 A      ROL      R0,2          ;LOOK AT NEXT FIELD
2079 0E20 A107 A      ST      R0,$FLD
2080 0E21 6107 A      AND      R0,D3        ;STRIP OUT FIELD
2081 0E22 A200 A      ST      R0,(R2)
2082 0E23 4A01 A      AISZ     R2,1
2083 0E24 7D02 A      DSZ      $CNT        ;FINISHED?
2084 0E25 21F8 A      JMP      $1          ;NO
2085 0E26 0202 A      RTS      2
2086 0E27 0E28 T $CNT: .=.+1
2087 0E28 0E29 T $FLD: .=.+1

2088 0E29              .PAGE
2089 0E29              ;
2090 0E29              ; PROCESS DATA RECORD
2091 0E29              ;
2092 0E29 0003 A D3:   .WORD    3
2093 0E2A 0400 A BIT5: .WORD    X'0400
2094 0E2B 0E2D T RELPNT: .WORD    RELOC
2095 0E2C              ; RECORD LENGTH
2096 0E2C 0E2D T RLTH: .=.+1
2097 0E2D              ; AMOUNT OF CORE AVAILABLE
2098 0E2D 0E39 T RELOC: .=.+12          ; CONTAINS UNPACKED RELOC I FO
2099 0E39              ; LAST AVAILABLE LOCATION FOR SYMBOL TABLE ENTRY
2100 0E39 0100 A SYMLIM: .WORD    X'100
2101 0E3A 0000 A $TYPE: .WORD    0          ;SAVE RECORD RELOC TYPE
2102 0E3B 0001 A BSREL: .WORD    1
2103 0E3C 0002 A TSREL: .WORD    2
2104 0E3D 0ECB T $LDPNT: .WORD    LDADR
2105 0E3E 0D25 T $DBASE: .WORD    BASE
2106 0E3F 3681 A $DAT:  RCPY     R1,R2      ;R1=LOC OF INPUT BUFFER
2107 0E40 8202 A      LD       R0,ILATYP(R2) ;RELOCATE INITIAL LOAD ADDRESS
2108 0E41 4D00 A      LI       R1,0
2109 0E42 F1F8 A      SKNE     R0,BSREL
2110 0E43 8702 A      LD       R1,BSLOC(R3)  ;BASE SECTOR RELOCATABLE
2111 0E44 F1F7 A      SKNE     R0,TSREL
2112 0E45 8703 A      LD       R1,TSLOC(R3)  ;TOP SECTOR RELOCATABLE
2113 0E46 C603 A      ADD      R1,ILA(R2)
2114 0E47 B5F5 A      ST      R1,@$LDPNT
2115 0E48 A1F1 A      ST      R0,$TYPE      ;SAVE REC RELOC TYPE
2116 0E49 8204 A      LD       R0,DTYP1(R2) ;GET FIRST RELOC WD
2117 0E4A 29CD A      JSR      UNPAK
2118 0E4B 0008 A $8D:  .WORD    8
2119 0E4C 0E2D T      .WORD    RELOC
2120 0E4D 81DE A      LD       R0,RLTH
2121 0E4E E1FC A      SKG      R0,$8D        ; REQUIRES 2 RELOC WORDS
2122 0E4F 2105 A      JMP      $70
2123 0E50 8976 A      LD       R2,$INPNT
2124 0E51 8205 A      LD       R0,DTYP2(R2)  ;GET SECOND RELOC WD
2125 0E52 29C5 A      JSR      UNPAK
2126 0E53 0004 A $4D:  .WORD    4
2127 0E54 0E35 T      .WORD    RELOC+8
2128 0E55 8971 A $70:  LD       R2,$INPNT
2129 0E56 81D5 A      LD       R0,RLTH        ;ADJUST RECORD LENGTH TO REFLECT
2130 0E57 D1F8 A      SUB      R0,$4D        ; NUMBER OF DATA WORDS
2131 0E58 A1D3 A      ST      R0,RLTH
2132 0E59 C171 A      ADD      R0,LDADR      ;CALCULATE LAST ADDR IN RECORD
2133 0E5A A16B A      ST      R0,$DATEND
2134 0E5B 81CF A      LD       R0,RELPNT    ;CALCULATE RELOC INFO ADDRESS
2135 0E5C A16B A      ST      R0,RELX
2136 0E5D 81DC A $72:  LD       R0,$TYPE    ;CHECK LOAD ADDRESS AGAINST RANGES
2137 0E5E 856C A      LD       R1,LDADR
2138 0E5F 5600 A      XCHRS   R2
2139 0E60 99DD A      LD       R2,@$DBASE    ;GET BASE ADDRESS

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2140	0E61	F1D9	A	SKNE	RO,BSREL	
2141	0E62	2110	A	JMP	\$75	;BASE SECTOR RELATIVE
2142	0E63	1109	A	BOC	ZRO,\$74	;ABSOLUTE
2143	0E64	E602	A	SKG	R1,TSMAX-BASE(R2)	;TOP SECTOR RELATIVE
2144	0E65	2104	A	JMP	\$73	;LIMIT SET OK
2145	0E66	A602	A	ST	R1,TSMAX-BASE(R2)	
2146	0E67	E707	A	SKG	R1,HITOP(R3)	
2147	0E68	2101	A	JMP	\$73	
2148	0E69	A707	A	ST	R1,HITOP(R3)	
2149	0F6A	E708	A	\$73:	SKG	R1,LOTOP(R3)
2150	0E6B	A708	A	ST	R1,LOTOP(R3)	
2151	0E6C	210E	A	JMP	\$78	
2152	0E6D	E709	A	\$74:	SKG	R1,HIABS(R3)
2153	0E6E	2101	A	JMP	\$74A	
2154	0E6F	A709	A	ST	R1,HIABS(R3)	
2155	0E70	E70A	A	\$74A:	SKG	R1,LOABS(R3)
2156	0E71	A70A	A	ST	R1,LOABS(R3)	
2157	0E72	2108	A	JMP	\$78	
2158	0F73	E601	A	\$75:	SKG	R1,BSMAX-BASE(R2)
2159	0E74	2104	A	JMP	\$76	
2160	0E75	A601	A	ST	R1,BSMAX-BASE(R2)	
2161	0E76	E705	A	SKG	R1,HIBAS(R3)	
2162	0F77	2101	A	JMP	\$76	
2163	0E78	A705	A	ST	R1,HIBAS(R3)	
2164	0E79	E706	A	\$76:	SKG	R1,LOBAS(R3)
2165	0E7A	A706	A	ST	R1,LOBAS(R3)	
2166	0E7B			\$78:		
2167	0E7B	814F	A	\$78A:	LD	RO,LDADR
2168	0E7C	7148	A	\$79:	SKAZ	RO,\$FF00 ;CHECK OVERLAP OF INDIRECT POINTERS
2169	0E7D	2108	A	JMP	\$80	;OK
2170	0E7E	E203	A	SKG	RO,BOTEXT-BASE(R2)	
2171	0E7F	2103	A	JMP	+.4	
2172	0E80	4600	A	PULL	R2	
2173	0E81	4F08	A	\$79A:	LI	R3,AREA ;LOADING IN ILLEGAL AREA
2174	0E82	0200	A	RTS	ERR	
2175	0E83	E204	A	SKG	RO,EXTLIM-BASE(R2)	
2176	0E84	2101	A	JMP	\$80	
2177	0F85	A204	A	ST	RO,EXTLIM-BASE(R2)	
2178	0E86	4600	A	\$80:	PULL	R2
2179	0E87	9140	A	LD	RO,@RELX	
2180	0F88	1135	A	BOC	ZRO,\$84	;ABSOLUTE
2181	0E89	F1B1	A	SKNE	RO,BSREL	
2182	0E8A	2108	A	JMP	\$83	;BASE SECTOR RELOCATABLE
2183	0E8B	F19D	A	SKNE	RO,EXT	
2184	0E8C	2112	A	JMP	\$86	;EXTERNAL REFERENCE
2185	0E8D	8206	A	LD	RO,DATA(R2)	;TOP SECTOR RELOCATABLE
2186	0E8E	C303	A	ADD	RO,TSLOC(R3)	;TSECT ORIGIN
2187	0E8F	E01D	B	SKG	RO,HICORE	
2188	0E90	212E	A	JMP	\$85	
2189	0E91	4F09	A	LI	R3,CORE	;EXCEEDED MEMORY SIZE
2190	0E92	0200	A	RTS	ERR	
2191	0E93	8606	A	\$83:	LD	R1,DATA(R2) ;BASE SECTOR RELOCATABLE
2192	0E94	8302	A	LD	RO,BSLOC(R3)	
2193	0E95	3400	A	RADD	R1,RO	
2194	0E96	3182	A	RXOR	RO,R1	;TEST FOR ADDRESS OVERFLOW
2195	0E97	752D	A	SKAZ	R1,\$FF00	
2196	0E98	21E8	A	JMP	\$79A	
2197	0E99	757D	A	\$83B:	SKAZ	R1,BIT8
2198	0E9A	2101	A	JMP	+.2	
2199	0E9B	2123	A	JMP	\$85	;LEGAL RANGE -- 0-127
2200	0E9C	757D	A	SKAZ	R1,XRMASK	;XR SPECIFIED?
2201	0E9D	21E3	A	JMP	\$79A	
2202	0E9E	2120	A	JMP	\$85	
2203	0E9F	8606	A	\$86:	LD	R1,DATA(R2)
2204	0EA0	6578	A	AND	R1,D255	;STRIP OUT REFERENCE NUMBER
2205	0EA1			SEARCH	SYMBOL TABLE FOR	MATCHING REFERENCE NUMBER
2206	0EA1	4200	A	PUSH	R2	;SAVE VALUE OF R2
2207	0EA2	8B00	A	LD	R2,SYMTOP(R3)	

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2208	0EA3	82FF	A	\$87:	LD	RO,REFNR(R2)	
2209	0EA4	6174	A		AND	RO,D255	;STRIP OUT REFNR
2210	0EA5	3482	A		RXOR	R1,RO	
2211	0EA6	1104	A		BOC	ZRO,\$88	;MATCH FOUND
2212	0EA7	4AFB	A		AISZ	R2,-5	
2213	0EA8	EB01	A		SKG	R2,SYMBOT(R3)	
2214	0EA9	2111	A		JMP	\$89	;SEARCH COMPLETE - NO MATCH
2215	0EAA	21F8	A		JMP	\$87	;SEARCH NOT COMPLETE
2216	0EAB	5700	A	\$88:	XCHRS	R3	;DATA POINTER TO R3, VECTOR
2217	0EAC						;POINTER TO STACK
2218	0EAC	8306	A		LD	RO,DATA(R3)	
2219	0EAD	7117	A		SKAZ	RO,\$FF00	
2220	0EAE	211D	A		JMP	\$90	;INSTRUCTION
2221	0EAF	8200	A		LD	RO,RCHAIN(R2)	;DATA ITEM
2222	0EB0	4200	A		PUSH	R2	
2223	0EB1	8919	A		LD	R2,LDADR	
2224	0EB2	2C55	I		JSR	STORE	
2225	0EB3	4600	A		PULL	R2	
2226	0EB4	82FF	A		LD	RO,REFNR(R2)	
2227	0EB5	1202	A		BOC	PZRO,+.3	;SYMBOL DEFINED
2228	0EB6	2500	A		JMP	@.+1	
2229	0EB7	0F59	T	\$88A:	.WORD	\$101	
2230	0EB8	8512	A		LD	R1,LDADR	
2231	0EB9	A600	A		ST	R1,VALU(R2)	
2232	0EBA	25FC	A		JMP	@\$88A	
2233	0EBB	4F07	A	\$89:	LI	R3,XREF	;REF NMBR OF EXT SYMB NOT IN SYMB TBL
2234	0EBC	4400	A		PULL	RO	
2235	0EBD	0200	A		RTS	ERR	
2236	0EBE	8206	A	\$84:	LD	RO,DATA(R2)	;ABSOLUTE
2237	0EBF	4200	A	\$85:	PUSH	R2	
2238	0EC0	890A	A		LD	R2,LDADR	
2239	0EC1	2C55	I		JSR	STORE	
2240	0EC2	4600	A		PULL	R2	
2241	0EC3	2500	A		JMP	@.+1	
2242	0EC4	0F5B	T		.WORD	\$102	
2243	0EC5	FF00	A	\$FF00:	.WORD	X'FF00	
2244	0EC6	0000	A	\$DATEN:	.WORD	0	;END OF RECORD
2245	0EC7			:	CURRENT	LOADING ADDRESS	
2246	0EC7	0BD4	T	\$INPNT:	.WORD	INBUF	
2247	0EC8	0000	A	RELX:	.WORD	0	;WILL CONTAIN ABS ADDR OF RELOC INFO FOR
2248	0EC9			:			FOR DATA RECORD
2249	0EC9	0002	A	D2:	.WORD	2	
2250	0ECA	0001	A	D1:	.WORD	1	
2251	0ECB	0000	A	LDADR:	.WORD	0	
2252	0ECC	82FF	A	\$90:	LD	RO,REFNR(R2)	;INSTRUCTION
2253	0ECD	1B6B	A		BOC	NZRO,\$98	;SYMBOL DEFINED
2254	0ECE	8306	A	\$91:	LD	RO,DATA(R3)	;CHECK INSTRUCTION TYPE
2255	0ECF	5CF8	A		SHR	RO,8	;RIGHT-JUSTIFY UPPER HALF ONLY
2256	0ED0	130C	A		BOC	ODD,\$92A	;ADDRESSING ERROR
2257	0ED1	140B	A		BOC	BIT1,\$92A	;ADDRESSING ERROR
2258	0ED2	E141	A		SKG	RO,D127	
2259	0ED3	2105	A		JMP	\$92	;NOT LOAD/STORE
2260	0ED4	613B	A		AND	RO,RMASK	;LOAD/STORE - CLEAR R FIELD
2261	0ED5	F141	A		SKNE	RO,LDINST	
2262	0ED6	2109	A		JMP	\$93	;OK
2263	0ED7	F140	A		SKNE	RO,STINST	
2264	0ED8	2107	A		JMP	\$93	;OK
2265	0ED9	F13B	A	\$92:	SKNE	RO,JMPIN	
2266	0EDA	2107	A		JMP	\$94	;OK
2267	0EDB	F13A	A		SKNE	RO,JSRIN	
2268	0EDC	2105	A		JMP	\$94	;OK
2269	0EDD	4F06	A	\$92A:	LI	R3,ADDR	;ADDRESSING ERROR
2270	0EDE	4400	A		PULL	RO	;RESTORE STACK
2271	0EDF	0200	A		RTS	ERR	
2272	0EE0	8131	A	\$93:	LD	RO,\$BIT3	;LOAD/STORE
2273	0EE1	2101	A		JMP	+.2	
2274	0EE2	812E	A	\$94:	LD	RO,\$INDB	;JUMP CLASS
2275	0EE3	6B06	A		OR	RO,DATA(R3)	;SET INDIRECT BIT

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2276 0EE4 4200 A      PUSH      R2
2277 0EE5 89E5 A      LD        R2,LDADR
2278 0EE6 2C55 I      JSR       STORE
2279 0EE7 4600 A      PULL      R2
2280 0EE8 82FF A      LD        R0,REFNR(R2)
2281 0EE9 7129 A      SKAZ      R0,$INREF      ;HAS IND PNTR BEEN GENERATED
2282 0EEA 2131 A      JMP       $95
2283 0EEB 4300 A      PUSH      R3      ;NO-SAVE R3
2284 0EEC 9D2E A      LD        R3,@IBASE
2285 0EED 8703 A      LD        R1,BOTEXT-BASE(R3)
2286 0EEE E704 A      SKG       R1,EXTLIM-BASE(R3) ;SPACE AVAILABLE
2287 0EEF 211C A      JMP       $94A      ;NO - BSECT OVFL0
2288 0EF0 4200 A      PUSH      R2
2289 0EF1 89D9 A      LD        R2,LDADR
2290 0EF2 2C66 I      JSR       LOAD
2291 0EF3 4600 A      PULL      R2
2292 0EF4 6177 A      AND       R0,XFF00      ;STRIP OFF DISPL FIELD
2293 0EF5 3100 A      RADD      R0,R1      ;ADD ADDR OF IND POINTER
2294 0EF6 3481 A      RCPY      R1,R0
2295 0EF7 4200 A      PUSH      R2
2296 0EF8 89D2 A      LD        R2,LDADR
2297 0EF9 2C55 I      JSR       STORE
2298 0EFA 4600 A      PULL      R2
2299 0EFB 8117 A      LD        R0,$INREF      ;SET 'POINTER GENERATED' FLAG
2300 0EFC 6AFF A      OR        R0,REFNR(R2)
2301 0EFD A2FF A      ST        R0,REFNR(R2)
2302 0EFE 8600 A      LD        R1,RCHAIN(R2)
2303 0EFF 4000 A      PUSH      R0
2304 0F00 3481 A      RCPY      R1,R0
2305 0F01 4200 A      PUSH      R2
2306 0F02 8B03 A      LD        R2,BOTEXT-BASE(R3)
2307 0F03 2C55 I      JSR       STORE
2308 0F04 4600 A      PULL      R2
2309 0F05 4400 A      PULL      R0
2310 0F06 8703 A      LD        R1,BOTEXT-BASE(R3)
2311 0F07 7F03 A      DSZ      BOTEXT-BASE(R3)
2312 0F08 4700 A      PULL      R3      ;RESTORE R3
2313 0F09 1B4F A      BOC       NZRO,$101      ;SYMBOL DEFINED
2314 0F0A A600 A      ST        R1,RCHAIN(R2)
2315 0F0B 214D A      JMP       $101
2316 0F0C 4700 A $94A: PULL      R3      ;BSECT OVERFLOW
2317 0F0D 4400 A      PULL      R0      ;RESTORE STACK
2318 0F0E 4F03 A      LI        R3,BSOV
2319 0F0F 0200 A      RTS       ERR
2320 0F10 00F3 A RMask: .WORD    X'F3
2321 0F11 0400 A $INDB: .WORD    X'400
2322 0F12 1000 A $BIT3: .WORD    X'1000
2323 0F13 4000 A $INREF: .WORD    X'4000
2324 0F14 007F A D127: .WORD    127
2325 0F15 0020 A JMPIN: .WORD    X'20
2326 0F16 0028 A JSRIN: .WORD    X'28
2327 0F17 0080 A LDINST: .WORD    X'80
2328 0F18 0F17 T BIT8  =        LDINST
2329 0F18 00A0 A STINST: .WORD    X'A0

2330 0F19          .PAGE
2331 0F19          ;      IND POINTER ALREADY GENERATED
2332 0F19 00FF A D255: .WORD    255
2333 0F1A 0300 A XRMASK: .WORD    X'300
2334 0F1B 0D25 T IBase: .WORD    BASE
2335 0F1C 1202 A $95:   BOC       PZRO,$95A      ;EXT SYMBOL UNDEFINED
2336 0F1D 2500 A      JMP       @.+1
2337 0F1E 0FA6 T      .WORD    $110
2338 0F1F 8A00 A $95A: LD        R2,RCHAIN(R2)
2339 0F20 5700 A      XCHRS    R3      ;VECTOR ADDR TO R3
2340 0F21 E9F7 A $96:   SKG       R2,D255      ;IF SKIP, THIS IS NOT IT

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GENLDR

2341	0F22	2101	A	JMP	.*+2	
2342	0F23	210E	A	JMP	\$97	
2343	0F24	EB05	A	SKG	R2,HIBAS(R3)	;LOOK AT NEXT ELEMENT
2344	0F25	210C	A	JMP	\$97	;IF SKIP, POINTER FOUND
2345	0F26	5700	A	XCHRS	R3	;LOOK AT NEXT ELEMENT
2346	0F27	4200	A	PUSH	R2	;DATA IX TO R3
2347	0F28	89A2	A	LD	R2,LOADR	
2348	0F29	2C66	I	JSR	LOAD	
2349	0F2A	3181	A	RCPY	R0,R1	
2350	0F2B	4600	A	PULL	R2	
2351	0F2C	653F	A	\$96C: AND	R1,XFF00	;THROW AWAY BITS 8-15
2352	0F2D	3982	A	RXOR	R2,R1	
2353	0F2E	3481	A	RCPY	R1,R0	
2354	0F2F	899B	A	LD	R2,LOADR	
2355	0F30	2C55	I	JSR	STORE	
2356	0F31	2127	A	JMP	\$101	;ALL DONE
2357	0F32	2C66	I	\$97: JSR	LOAD	
2358	0F33	3281	A	RCPY	R0,R2	
2359	0F34	1B01	A	BOC	NZRO,.*+2	
2360	0F35	21EB	A	JMP	\$96	
2361	0F36	4400	A	PULL	R0	
2362	0F37	4F0A	A	LI	R3,SYST	
2363	0F38	0200	A	RTS	ERR	
2364	0F39			;	INSTRUCTION REFERENCE - SYMBOL DEFINED	
2365	0F39	8200	A	\$98: LD	R0,VALU(R2)	;LOOK AT SYMBOL VALUE
2366	0F3A	E1D9	A	SKG	R0,D127	
2367	0F3B	211A	A	JMP	\$100	
2368	0F3C	E1DC	A	SKG	R0,D255	
2369	0F3D	2115	A	JMP	\$99	
2370	0F3E	8306	A	LD	R0,DATA(R3)	;CHECK XR FIELD
2371	0F3F	61DA	A	AND	R0,XRMASK	
2372	0F40	158D	A	BOC	NEZ,\$91	;XR NOT EQUAL TO ZERO
2373	0F41	8200	A	LD	R0,VALU(R2)	;CALCULATE REQD DISPLACEMENT FOR PC
2374	0F42	D188	A	SUB	R0,LOADR	;ADDRESSING
2375	0F43	D186	A	SUB	R0,D1	
2376	0F44	E126	A	SKG	R0,M129	
2377	0F45	2188	A	JMP	\$91	
2378	0F46	E1CD	A	SKG	R0,D127	
2379	0F47	2102	A	JMP	.*+3	
2380	0F48	2500	A	JMP	@.*+1	
2381	0F49	0ECE	T	.WORD	\$91	
2382	0F4A	61CE	A	AND	R0,D255	
2383	0F4B	C11E	A	ADD	R0,\$D256	; SET XR = 1
2384	0F4C	8706	A	LD	R1,DATA(R3)	
2385	0F4D	651E	A	AND	R1,XFF00	;THROW AWAY OLD DISPLACEMENT
2386	0F4E	3100	A	RADD	R0,R1	
2387	0F4F	3481	A	RCPY	R1,R0	
2388	0F50	991C	A	LD	R2,@\$ADDR	
2389	0F51	2C55	I	JSR	STORE	
2390	0F52	2106	A	JMP	\$101	
2391	0F53	8306	A	\$99: LD	R0,DATA(R3)	;CHECK XR FIELD
2392	0F54	61C5	A	AND	R0,XRMASK	
2393	0F55	154A	A	BOC	NEZ,\$103A	;ADDRESSING ERROR
2394	0F56	8A00	A	\$100: LD	R2,VALU(R2)	;SET DISPL=SYMBOL VALUE
2395	0F57	8706	A	LD	R1,DATA(R3)	;PICK UP DATA WORD
2396	0F58	21D3	A	JMP	\$96C	
2397	0F59	5700	A	\$101: XCHRS	R3	;VECTOR PNTR TO R3
2398	0F5A	4600	A	PULL	R2	;DATA PNTR TO R2
2399	0F5B	9111	A	\$102: LD	R0,@\$ADDR	
2400	0F5C	4801	A	AISZ	R0,1	
2401	0F5D	B10F	A	ST	R0,@\$ADDR	
2402	0F5E	4A01	A	AISZ	R2,1	
2403	0F5F	950F	A	LD	R1,@\$PDAT	
2404	0F60	5101	A	CAI	R1,1	
2405	0F61	3400	A	RADD	R1,R0	
2406	0F62	1501	A	BOC	NEZ,.*+2	;IF BRANCH, NOT DONE
2407	0F63	0203	A	RTS	NRML	

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2408 0F64 9109 A      LD      R0,@$PREL
2409 0F65 4801 A      AISZ    R0,1
2410 0F66 8107 A      ST      R0,@$PREL
2411 0F67 4200 A      PUSH    R2                ;ADD AN ELEMENT TO THE STACK
2412 0F68 2500 A      JMP     @.+1            ; CONTINUE
2413 0F69 0E5D T      .WORD   $72
2414 0F6A 0100 A $D256: .WORD   256
2415 0F6B FF7F A M129: .WORD  -129
2416 0F6C FF00 A XFF00: .WORD  X'FF00
2417 0F6D 0ECB T $ADDR: .WORD  LADDR
2418 0F6E 0EC8 T $PREL: .WORD  RELX
2419 0F6F 0EC6 T $PDAT: .WORD  $DATEN

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2420 0F70                .PAGE
2421 0F70                ;
2422 0F70                ;      PROCESS END RECORD
2423 0F70                ;
2424 0F70 3681 A $END:   RCPY    R1,R2
2425 0F71 1B01 A      BOC     NZRO,.,+2
2426 0F72 8203 A      LD      R0,ENTYAD(R2)    ;RELOCATE ENTRY POINT
2427 0F73 8602 A      LD      R1,ENTYP(R2)
2428 0F74 F530 A      SKNE    R1,$EXT        ; EXTERNAL SYMBOL
2429 0F75 2117 A      JMP     $104
2430 0F76 F52C A      SKNE    R1,XBSREL
2431 0F77 C302 A      ADD     R0,BSLOC(R3)
2432 0F78 F52B A      SKNE    R1,XTSREL
2433 0F79 C303 A      ADD     R0,TSLOC(R3)
2434 0F7A A304 A      ST      R0,ENTRY(R3)
2435 0F7B 4600 A $102A: PULL    R2
2436 0F7C 8203 A      LD      R0,BOTEXT-BASE(R2)
2437 0F7D 4801 A      AISZ    R0,1
2438 0F7E A30C A      ST      R0,PBOT(R3)
2439 0F7F                ;      RESET B/S AND T/S ORIGINS
2440 0F7F 8201 A      LD      R0,BSMAX-BASE(R2)
2441 0F80 4801 A      AISZ    R0,1
2442 0F81 A302 A      ST      R0,BSLOC(R3)
2443 0F82 8202 A      LD      R0,TSMAX-BASE(R2)
2444 0F83 4801 A      AISZ    R0,1
2445 0F84 A303 A      ST      R0,TSLOC(R3)
2446 0F85 8800 A      LD      R2,SYMTOP(R3)
2447 0F86 82FF A $103:   LD      R0,REFNR(R2)    ;CLEAR REFNR'S TO ZERO
2448 0F87 61E4 A      AND     R0,XFF00
2449 0F88 A2FF A      ST      R0,REFNR(R2)
2450 0F89 4AFB A      AISZ    R2,-SYMNWE
2451 0F8A EB01 A      SKG     R2,SYMBOT(R3)
2452 0F8B 0202 A      RTS     EOM
2453 0F8C 21F9 A      JMP     $103
2454 0F8D                ;      SEARCH SYMBOL TABLE FOR MATCHING REFNR
2455 0F8D 8800 A $104:   LD      R2,SYMTOP(R3)
2456 0F8E 86FF A $105:   LD      R1,REFNR(R2)    ; REFNR FROM SYMBOL TABLE
2457 0F8F 6589 A      AND     R1,D255
2458 0F90 3182 A      RXOR    R0,R1
2459 0F91 F510 A      SKNE    R1,$ZERO        ;NO MATCH
2460 0F92 2104 A      JMP     $106            ;MATCH FOUND
2461 0F93 4AFB A      AISZ    R2,-5
2462 0F94 EB01 A      SKG     R2,SYMBOT(R3)
2463 0F95 2108 A      JMP     $107            ; DONE - NO MATCH
2464 0F96 21F7 A      JMP     $105
2465 0F97 82FF A $106:   LD      R0,REFNR(R2)
2466 0F98 1B02 A      BOC     NZRO,.,+3        ; SYMBOL DEFINED
2467 0F99 4C00 A      LI      R0,0            ; UNDEFINED ENTRY POINT
2468 0F9A 2101 A      JMP     .+2
2469 0F9B 8200 A      LD      R0,VALU(R2)      ;VALUE IS ENTRY POINT
2470 0F9C A304 A      ST      R0,ENTRY(R3)
2471 0F9D 21DD A      JMP     $102A

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GENLDR

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2472 0F9E 4F07 A $107: LI R3,XREF
2473 0F9F 0200 A RTS ERR
2474 0FA0 4F06 A $103A: LI R3,ADDR ;ADDRESSING ERROR
2475 0FA1 0200 A RTS ERR
2476 0FA2 0000 A $ZERO: .WORD 0
2477 0FA3 0001 A XBSREL: .WORD 1
2478 0FA4 0002 A XTSREL: .WORD 2
2479 0FA5 0003 A $EXT: .WORD 3
2480 0FA6 ; PROCESS A DEFINED EXTERNAL SYMBOL
2481 0FA6 8200 A $110: LD R0,VALU(R2) ;SEARCH IND POINTER LIST
2482 0FA7 AD16 A ST R3,$R3A
2483 0FA8 9D17 A LD R3,@$BAS2 ;GET BASE ADDRESS
2484 0FA9 8B03 A LD R2,BOTEXT-BASE(R3)
2485 0FAA 4A01 A AISZ R2,1
2486 0FAB 4000 A $111: PUSH R0
2487 0FAC 4300 A PUSH R3
2488 0FAD 3B81 A RCPY R2,R3
2489 0FAE 2C66 I JSR LOAD
2490 0FAF A10F A ST R0,$TMP
2491 0FB0 4700 A PULL R3
2492 0FB1 4400 A PULL R0
2493 0FB2 F10C A SKNE R0,$TMP
2494 0FB3 2107 A JMP $112 ;FOUND POINTER
2495 0FB4 4A01 A AISZ R2,1
2496 0FB5 F9B4 A SKNE R2,$D256
2497 0FB6 2101 A JMP .+2
2498 0FB7 21F3 A JMP $111
2499 0FB8 4400 A PULL R0
2500 0FB9 4F0A A LI R3,SYST ;POINTER NOT FOUND
2501 0FBA 0200 A RTS ERR
2502 0FBB 8D02 A $112: LD R3,$R3A
2503 0FBC 2500 A JMP @.+1
2504 0FBD 0F27 T .WORD $96B
2505 0FBE 0FBF T $R3A: . = . + 1
2506 0FBF 0FC0 T $TMP: . = . + 1
2507 0FC0 0D25 T $BAS2: .WORD BASE
2508 0FC1 .IF GENL ;. . . . .

2509 0FC1 .PAGE 'CLEAR MEMORY SUBROUTINE'

2510 0FC1 .SPACE 2
2511 0FC1 ; ON ENTRY: R0 = 0
2512 0FC1 ; R1 = NUMBER OF WORDS TO CLEAR
2513 0FC1 ; R2 = LOWEST ADDRESS TO CLEAR - 1
2514 0FC1 ; R3 = ENTRY POINT

2515 0FC1 .SPACE 2
2516 0FC1 4A01 A CLEAR: AISZ R2,1
2517 0FC2 A200 A ST R0,(R2)
2518 0FC3 49FF A AISZ R1,-1 ;NOT ZEROED
2519 0FC4 21FC A JMP .-3 ;NOT ZEROED
2520 0FC5 2300 A JMP (R3) ;NOT ZEROED

2521 0FC6 .SPACE 2
2522 0FC6 .ENDIF ;. . . . .
2523 0FC6 0880 T GLDRE: .END DSCLDR

POINTERS GENERATED
004C 0A08 T
004D 0AFA T
004E 0D0A T
004F 0ADD T
0050 09C4 T
0051 0969 T
0052 088E T

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0053 0801 T
 0054 081D T
 0055 0873 T
 0056 09CD T
 0057 0997 T
 0058 0D1F T
 0059 0AEB T
 005A 0B39 T
 005B 088B T
 005C 0A1E T
 005D 0A99 T
 005E 0AA4 T
 005F 0A9E T
 0060 0AA3 T
 0061 0A88 T
 0062 0AA7 T
 0063 0AC8 T
 0064 09F1 T
 0065 089F T
 0066 0B6B T

***** O ERRORS IN ASSEMBLY *****

\$1&	\$1'	\$1{	\$1)	\$1+	\$1,	\$1-	\$1.	\$100A	\$101A
08C5 T	08D6 T	08DB T	08E0 T	09Q6 T	094B T	0971 T	09A6 T	0F56 T	0F59 T
\$102A	\$102AA	\$103A	\$103AA	\$104A	\$105A	\$106A	\$107A	\$10A	\$11
0F5B T	0F7B T	0F86 T	0FA0 T	0F8D T	0F8E T	0F97 T	0F9E T	0D57 T	09D4 T
\$110A	\$111A	\$112A	\$11A	\$12A	\$147	\$14A	\$15	\$18	\$19
0FA6 T	0FAB T	0FBB T	0D58 T	0D5B T	0A85 T	0D61 T	0A2E T	0AE4 T	0AED T
\$1;	\$1=	\$1?	\$1A	\$1A5	\$1B5	\$2&	\$2+	\$2,	\$2-
0B05 T	0B40 T	0B78 T	0E1E T	0A27 T	0A26 T	08CD T	0915 T	094E T	0985 T
\$2.	\$20A	\$21	\$21A	\$22	\$22A	\$23A	\$24A	\$25	\$25A
09AE T	0D66 T	09D0 T	0D68 T	09F5 T	0D6A T	0D6C T	0D6D T	0A30 T	0D48 T
\$25AA	\$27	\$2=	\$2?	\$2A+	\$2A,	\$2B,	\$3"	\$3&	\$3+
0D51 T	0ACF T	0B4E T	0B7F T	090A T	0956 T	0951 T	0B90 T	08CE T	0919 T
\$3,	\$3-	\$31	\$32	\$34A	\$35	\$36A	\$37	\$38A	\$3;
0960 T	0988 T	09E3 T	09FA T	0D92 T	0A36 T	0D93 T	0AD1 T	0D9E T	0B0B T
\$3?	\$4"	\$4&	\$4+	\$4-	\$40A	\$41	\$42	\$45	\$45A
0B88 T	0BA4 T	0BD0 T	092D T	098B T	0D9F T	09E6 T	09FD T	0A3E T	0DAB T
\$46A	\$47A	\$48A	\$4=	\$4A+	\$4A=	\$4DA	\$5+	\$5-	\$51
0DB8 T	0DC0 T	0DC6 T	0B53 T	0931 T	0B5C T	0E53 T	093F T	098F T	09E8 T
\$55	\$55A	\$57	\$5=	\$6"	\$6-	\$60A	\$63A	\$65	\$65A
0A82 T	0DC9 T	0AD4 T	0B5F T	0B96 T	0992 T	0DCD T	0DD3 T	0A93 T	0DD5 T
\$66A	\$67	\$6;	\$6=	\$70A	\$72A	\$73A	\$74A	\$74AA	\$75
0DD8 T	0AD6 T	0B10 T	0B65 T	0E55 T	0E5D T	0E6A T	0E6D T	0E70 T	0A86 T
\$75A	\$76A	\$77	\$78A	\$78AA	\$79A	\$79AA	\$7;	\$80A	\$83A
0E73 T	0E79 T	0AD8 T	0E7B T	0E7B T	0E7C T	0E81 T	0B15 T	0E86 T	0E93 T
\$83BA	\$84A	\$85A	\$86A	\$87	\$87A	\$88A	\$88AA	\$89A	\$8;
0E99 T	0EBE T	0EBF T	0E9F T	0ADA T	0EA3 T	0EAB T	0EB7 T	0EBB T	0B17 T
\$8DA	\$90A	\$91A	\$92A	\$92AA	\$93A	\$94A	\$94AA	\$95A	\$95AA
0E4B T	0ECC T	0ECE T	0ED9 T	0EDD T	0EE0 T	0EE2 T	0F0C T	0F1C T	0F1F T

GENLDR

\$96A	\$96AA	\$96BA	\$96CA	\$97A	\$98A	\$99A	\$A.	\$ADDRA	\$B0,
0F21 T	0F26 T	0F27 T	0F2C T	0F32 T	0F39 T	0F53 T	0999 T	0F6D T	0966 T
\$B1,	\$BAS2A	\$BIT3A	\$BLANA	\$BSREA	\$CKSE5	\$CL,	\$CNTA	\$CNTR=	\$D256A
0967 T	0FC0 T	0F12 T	0D31 T	0DF5 T	0A46 T	0968 T	0E27 T	0B38 T	0F6A T
\$D3A	\$D4A	\$D8A	\$DATA	\$DATEA	\$DBASA	\$ENDA	\$EXTA	\$FF00A	\$FIN5
0D2C T	0D2D T	0D2E T	0E3F T	0EC6 T	0E3E T	0F70 T	0FA5 T	0EC5 T	0A6F T
\$FLDA	\$INDBA	\$INPNA	\$INREA	\$L13	\$LDPNA	\$M7	\$NOFNA	\$OUTA	\$PDATA
0E28 T	0F11 T	0EC7 T	0F13 T	0A15 T	0E3D T	0AC7 T	0E08 T	0E04 T	0F6F T
\$PRELA	\$R29	\$R2;	\$R3A	\$R3AA	\$R6	\$RLADA	\$SEQE5	\$SEQG5	\$SEQM5
0F6E T	0AF9 T	0B00 T	0DE2 T	0FBE T	0AA3 T	0D2A T	0A5E T	0A52 T	0A72 T
\$SEQ05	\$SQG15	\$SQP5	\$SVROA	\$SVR1A	\$SVR2A	\$SVR3A	\$SYMBA	\$T1.	\$T11
0A61 T	0A5C T	0A6A T	0D7A T	0D7B T	0D7C T	0D7D T	0DA3 T	09B7 T	09F0 T
\$T1<	\$T2.	\$TITLA	\$TMPA	\$TOPA	\$TSREA	\$TYPEA	\$VLOC=	\$ZEROA	ABS
0B36 T	09B8 T	0D7E T	0FBF T	0DF9 T	0DF4 T	0E3A T	0B37 T	0FA2 T	0D2B T
ACMD2	ACRDBU	ADDR	AINBUF	ANSHEX	AREA	ASEQ	ASHI	ASLO	ATBL2
0006 B	0010 B	0006 A	0007 B	09F1 T	0008 A	0022 B	0009 A	000A A	000C B
ATBL3	ATBL4	AVECT	BASE	BIT0	BIT1	BIT2	BIT5	BIT8	BOTEXT
000D B	000F B	0011 B	0D25 T	0DE8 T	0004 A	0DA2 T	0E2A T	0F17 T	0D28 T
BSEQ	BSHI	BSLO	BSLOC	BSMAX	BSO	BSOV	BSPT	BSREL	BSSI2
0D20 B	0005 A	0006 A	0002 A	0D26 T	0002 A	0003 A	0B71 T	0E3B T	0002 A
BSZ	CARDIN	CARDR	CKSM	CKSUM	CLEAR	CLR	CLRFLG	CMD2	CORE
0004 B	0A88 T	0010 A	0001 A	0002 A	0FC1 T	08E2 T	08F8 T	0CE1 T	0Q09 A
CPAD	CR	CRDBUF	CRDFLG	D0	D1	D127	D2	D255	D256
08AF T	08DD T	0BE6 T	000B B	0D2B T	0ECA T	0F14 T	0EC9 T	0F19 T	0D30 T
D3	D30	DATA	DELAY	DELAY1	DISC	DSCLDR	DSKL	DTYP1	DTYP2
0E29 T	0D2F T	0006 A	FFF5 A	FFF6 A	0018 A	0880 T	0000 A	0004 A	0005 A
EA	EB	EC	ENDBUF	ENTEQ	ENTPT	ENTRY	ENTY	ENTYAD	ENTYP
0009 A	0016 A	0026 A	0008 B	0023 B	0004 A	0004 A	0001 B	0003 A	0002 A
EOM	ER	ERR	ETBL3	EXT	EXTLIM	FLAGS	GENL	GLDRE	GO
0002 A	08BC T	0000 A	000E B	0E29 T	0D29 T	FFFF A	0001 A	0FC6 T	0940 T
GPCS	H0000	H0002	H0004	H0008	H0009	H000A	H000D	H0011	H0013
0018 A	0025 B	0026 B	0027 B	0028 B	0029 B	002A B	002B B	002C B	002D B
H001F	H0020	H0021	H002F	H0030	H0037	H0039	H003A	H0040	H0046
002E B	002F B	0030 B	0031 B	0032 B	0033 B	0034 B	0035 B	0036 B	0037 B
H004D	H0055	H0059	H005F	H007D	H007E	H007F	H0080	H00C0	H00FF
0038 B	0039 B	003A B	003B B	003C B	003D B	003E B	003F B	0040 B	0041 B
H0100	H0D0A	H13FF	H1F00	H2020	H8000	HA000	HF000	HFF00	HFFEE
0042 B	0043 B	0044 B	0045 B	0046 B	0047 B	0048 B	0049 B	004A B	004B B
H1ABS	HIBAS	HICORE	HIGH1	HIGH2	HITOP	IBASE	ILA	ILATYP	IMP16L
0009 A	0005 A	001D B	0002 B	0005 B	0007 A	0F1B T	0003 A	0002 A	0001 A
INBUF	INDC	INDEVF	INLIM	INLOC	INVCMD	INVCT	JMPIN	JSRIN	LBST
0BD4 T	000B A	0012 B	0DE3 T	0DA0 T	089F T	001E B	0F15 T	0F16 T	0028 A
LCRD	LCRDP	LDADR	LDEND	LDINST	LDMS1	LDMS2	LDMS3	LDMS4	LDR1
0A05 T	0A01 T	0ECB T	0B72 T	0F17 T	0014 A	0009 A	000F A	0009 A	0D32 T
LECO1	LIMFLG	LINIT	LM	LOABS	LOAD	LOBAS	LODREC	LOLCHK	LOTOP
09BD T	0013 B	0A08 T	0BD5 T	000A A	0B6B T	0006 A	0D1F T	0A03 T	0008 A

GENLDR

LOW1	LOW2	LSTATE	LTECHD	LTECO	LTGET	LTTYT	LTTYTI	LVCT	MO
0000 B	0003 B	0D21 T	0AA7 T	0A00 T	09FF T	0AC8 T	0A1D T	000D A	0000 A
M1	M10	M129	M2	M3	M4	M5	M6	M7	M8
0001 A	000A A	0F6B T	0002 A	0003 A	0004 A	0005 A	0006 A	0007 A	0008 A
M9	MIN1	ML	MRCDL	MS1	MS2	MS3	MS4	MS5	MSG0
0009 A	0DE4 T	0007 A	0012 A	0BCA T	0BCC T	0BCE T	0BD2 T	0BD0 T	0B97 T
MSG1	MSG11	MSG12	MSG13	MSG14	MSG15	MSG16	MSG17	MSG18	MSG19
0BA6 T	0BB0 T	0BB2 T	0BB4 T	0BB6 T	0BB8 T	0BBA T	0BBC T	0BBE T	0BC0 T
MSG20	MSG21	MSG22	MSG23	MSG3	MSG5	MSG6	MSG7	NAM1	NAM2
0BC2 T	0BC4 T	0BC6 T	0BC8 T	0BA8 T	0BAA T	0BAC T	0BAE T	FFFC A	FFFD A
NAM3	NEZ	NLM	NMBR	NRML	NSEQ	NUMB	NZERO	NZRO	OBS
FFFE A	0005 A	08D3 T	0A7A T	0003 A	08D8 T	000A B	0005 A	000B A	08B0 T
ODD	OLCHK	ORCDL	OTS	OUTANS	OUTCH	OUTHEX	OUTMSG	OUTWD	PBOT
0003 A	0A8A T	0048 A	08B7 T	0ADD T	0A1E T	0AEB T	0B8E T	0AFA T	000C A
PBSEC	PNAM	POA	PRLIMS	PRSYMB	PT	PTECHD	PTGET	PTREQ	PTRHI
0C43 T	0004 A	000C A	0B39 T	0B1D T	0008 A	09BA T	09B9 T	0024 B	0015 B
PTRL0	PTRN	PTRP	PTTYT	PZRO	QCSTR	RO	R1	R2	R3
0014 B	000B A	000C A	0A1C T	0002 A	0007 A	0000 A	0001 A	0002 A	0003 A
RCDL	RCHAIN	RCRD1	RCRD1P	RDCARD	RDCMDC	RDCMDT	RDCRD	RDRLMC	RDRLMT
0000 A	0000 A	0A8E T	0A02 T	0A24 T	09C4 T	0969 T	0A92 T	09CD T	0997 T
READ	READCH	READCK	READCM	REFNR	RELOC	RELPNT	RELTYP	RELX	RESET
0002 A	09BB T	0003 A	088B T	FFFF A	0E2D T	0E2B T	0DA1 T	0EC8 T	0005 A
REST	RLM	RLMVCT	RLTH	RMASK	RSEQ	RTYP	SAVE	SEARCH	SEQ
0A9E T	08F9 T	001F B	0E2C T	0F10 T	0001 A	0D20 T	0A99 T	0DF6 T	08DA T
SEQCK	SETADR	SETPL	SRELOC	SRREG	START	STATCK	STATE	STATP	STATUS
0009 B	0004 A	0881 T	0002 A	0AA3 T	0016 B	0A27 T	0017 B	0A04 T	0001 A
STHI	STINST	STLO	STLOW	STORE	SWITCH	SY	SY1	SYM1	SYM2
0000 A	0F18 T	0001 A	0018 B	0B73 T	0D76 T	08BF T	08C1 T	0003 A	0007 A
SYM3	SYMBOL	SYMBOT	SYMLIM	SYMN1	SYMN2	SYMN3	SYMNO	SYMNWE	SYMOV
000B A	0DE9 T	0001 A	0E39 T	0DE5 T	0DE6 T	0DE7 T	0DE1 T	0005 A	0005 A
SYMTOP	SYST	TA	TB	TBL2	TBL3	TBL4	TC	TEMP	TEMP1
0000 A	000A A	0029 A	0012 A	0CBA T	0CE4 T	0D0A T	0070 A	0D22 T	001C B
TEMP2	TEMP3	TGET1	TGET2	TGET3	TITLE	TSEQ	TSHI	TSLO	TSLOC
0D23 T	0D24 T	09AF T	09B2 T	09BF T	0001 A	0021 B	0007 A	0008 A	0003 A
TSMAX	TSO	TSOV	TSREL	TSSIZ	TTY	TTYAD	TTYPE	TTYT1	UNPAK
0D27 T	0003 A	0004 A	0E3C T	0003 A	08DF T	0038 A	0008 A	0A21 T	0E18 T
VAL1	VAL2	VAL3	VALCNT	VALFLG	VALU	VALUE	VCT0	VCT1	VECL
0006 A	000A A	000E A	0019 B	001A B	0000 A	0B01 T	0C36 T	0CAD T	000C A
WDCNT	WRITE	XBSREL	XFF00	XREF	XRMASK	XTSREL	ZRO		
001B B	0007 A	0FA3 T	0F6C T	0007 A	0F1A T	0FA4 T	0001 A		

2E3E 8585

STY10

STTYIO

REVISION-G 05/16/74
STTYIO 00158C 07/01/74

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1 0000          .TITLE STTYIO,'00158C 07/01/74'
2 0000          ;
3 0000          ; STTYIO CONTAINS THE IMP-16L/16P TELETYPE I/O DRIVERS.
4 0000          ; THERE ARE FIVE FUNCTIONS:
5 0000          ;
6 0000          ;   SETPL - INITIALIZES STTYIO FOR 16L OR 16P AND
7 0000          ;           RESETS THE TELETYPE
8 0000          ;   INTEST - TESTS FOR TELETYPE INPUT
9 0000          ;   PUTC  - TRANSMITS A CHARACTER FROM BITS 0-7 OF
10 0000         ;           ACCUMULATOR 0 (ACO) TO THE TELETYPE
11 0000         ;   GETC  - RECEIVES A CHARACTER FROM THE TELETYPE FOR
12 0000         ;           TRANSFER TO BITS 0-7 OF ACO
13 0000         ;   GECO  - SAME AS GETC PLUS AN ECHO OF THE CHARACTER
14 0000         ;           ON THE TELETYPE PRINTER
15 0000         ;
16 0000         ; PROGRAM USE:
17 0000         ;
18 0000         ;   THE IMP-16L/16P USER MAY CALL THESE ROUTINES BY USING
19 0000         ;   THE JSR@ INSTRUCTION. THE FOLLOWING ADDRESSES IN
20 0000         ;   BASE PAGE ARE RESERVED FOR THIS PURPOSE.
21 0000         ;
22 0000         ;           ADDRESS      ROUTINE
23 0000         ;           000B        SETPL
24 0000         ;           000C        INTEST
25 0000         ;           000D        PUTC
26 0000         ;           000E        GETC
27 0000         ;           000F        GECO
28 0000         ;
29 0000         ; ***** IMPORTANT NOTE *****
30 0000         ; *
31 0000         ; * THE USER MUST MAKE A CALL TO THE *
32 0000         ; * ROUTINE 'SETPL' PRIOR TO ANY *
33 0000         ; * CALL ON THE OTHER FOUR ROUTINES *
34 0000         ; *
35 0000         ; *****
36 0000         ;
37 0000         ;
38 0000         ; PROGRAM LIMITATIONS AND CONVENTIONS
39 0000         ;
40 0000         ;   1. SETPL - NONE
41 0000         ;   2. INTEST - RETURN FROM SUBROUTINE IS AS FOLLOWS:
42 0000         ;           RTS 1 - NO INPUT FROM TELETYPE KEYBOARD
43 0000         ;           RTS 0 - ATTEMPT TO INPUT FROM TELETYPE
44 0000         ;           KEYBOARD
45 0000         ;   3. PUTC  - BITS 0-7 OF ACO ARE TRANSMITTED TO TTY
46 0000         ;   4. GETC  - BITS 0-7 OF ACO RECEIVE CHARACTER FROM TTY
47 0000         ;   5. GECO  - SAME AS GETC PLUS AN ECHO OF THE CHARACTER
48 0000         ;           ON THE TTY PRINTER
49 0000         ;   REGISTERS AND FLAGS ARE SAVED IN ALL ROUTINES EXCEPT
50 0000         ;   GETC AND GECO WHERE ACO IS ALTERED. THE STACK IS PUSHED
51 0000         ;   THREE LEVELS DEEP DURING EXECUTION OF THESE ROUTINES.
52 0000         ;
53 0000         ; .PAGE
54 0000 0000 A R0 = 0
55 0000 0001 A R1 = 1
56 0000 0002 A R2 = 2
57 0000 0003 A R3 = 3

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STTYIO

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58 0000 FFF5 A DELAY = 0FFF5
59 0000 FFF6 A DELAY1 = 0FFF6
60 0000 FFFB A TTYSR = 0FFFB
61 0000 000B A NEG = 11
62 0000 ;
63 0000 ; TELETYPE DELAY CONSTANTS
64 0000 ;
65 0000 ; THE FOLLOWING DELAY CONSTANTS ARE GOOD ONLY AT NORMAL
66 0000 ; SYSTEM SPEED, WHICH IS 175NS PERIOD IN THE SYSTEM
67 0000 ; OSCILLATOR.
68 0000 ;
69 0000 ;
70 0000 0029 A TA = 41
71 0000 0012 A TB = 18
72 0000 0070 A TC = 112
73 0000 0009 A EA = 9
74 0000 0016 A EB = 22
75 0000 0026 A EC = 38
76 0000 0038 A TTYAD = 7*8
77 0000 ;
78 0000 ;
79 0000 ; TRANSFER VECTOR
80 0000 ;
81 0000 .ASECT
82 0000 000B A .=0B
83 000B 006A T .WORD SETPL
84 000C 0043 T .WORD INTEST
85 000D 0014 T .WORD PPUTC
86 000E 0018 T .WORD GETC
87 000F 003F T .WORD PGECO
88 0010 ;
89 0010 .TSECT

90 0000 .PAGE
91 0000 ;
92 0000 ; TELETYPE TRANSMIT CHARACTER ROUTINE
93 0000 ;
94 0000 294A A LPITC: JSR SAVE
95 0001 3181 A RCPY R0,R1
96 0002 0A80 A PFLG 2
97 0003 4C30 A LI R0,X'30
98 0004 03F6 A JSRI DELAY1
99 0005 4E09 A LI R2,9
100 0006 4F38 A LI R3,TTYAD
101 0007 0603 A ROUT 3
102 0008 03F5 A LP1: JSRI DELAY
103 0009 5829 A ROL R0,TA
104 000A 4AFF A AISZ R2,-1
105 000B 2101 A JMP .+2
106 000C 2104 A JMP DONE
107 000D 59FF A ROR R1,1
108 000E 3481 A RCPY R1,R0
109 000F 0603 A ROUT 3
110 0010 21F7 A JMP LP1
111 0011 4CFF A DONE: LI R0,-1
112 0012 0603 A ROUT 3
113 0013 2149 A JMP RESTOR
114 0014 ;
115 0014 ;
116 0014 2936 A PPUTC: JSR SAVE
117 0015 2D01 A JSR @PPUTCA
118 0016 2146 A JMP RESTOR

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119 0017      ;
120 0017 7E59 A PPUTCA: .WORD  07E59
121 0018      ;
122 0018      ;
123 0018      ;      GET CHARACTER ROUTINE
124 0018      ;
125 0018 2932 A GETC:   JSR      SAVE
126 0019 2D02 A PGETC: JSR      @PGETCA
127 001A A13C A        ST      R0,REG
128 001B 2141 A        JMP      RESTOR
129 001C      ;
130 001C 7E3B A PGETCA: .WORD  07E3B

131 001D      .PAGE
132 001D      ;
133 001D      ;      GET CHARACTER AND ECHO ROUTINE
134 001D      ;
135 001D 292D A LGECO:  JSR      SAVE
136 001E 4F38 A        LI      R3,TTYAD
137 001F 0A80 A        PFLG    2
138 0020 0605 A        ROUT    5
139 0021 4E08 A        LI      R2,8
140 0022 0604 A        ROUT    4
141 0023 0402 A        RIN     2
142 0024 1201 A        BOC     2,.,+2
143 0025 21FD A        JMP     .-2
144 0026 4C09 A        LI      R0,EA
145 0027 03F6 A        JSRI    DELAY1
146 0028 58EA A        ROR     R0,EB
147 0029 0402 A        RIN     2
148 002A 1201 A        BOC     2,.,+2
149 002B 21F4 A        JMP     LGECO+3
150 002C 0603 A LP3:   ROUT    3
151 002D 03F5 A        JSRI    DELAY
152 002E 5826 A        ROL     R0,EC
153 002F 0402 A        RIN     2
154 0030 610D A        AND     R0,MASK
155 0031 5DFF A        SHR     R1,1
156 0032 3182 A        RXOR    R0,R1
157 0033 4AFF A        AISZ    R2,-1
158 0034 21F7 A        JMP     LP3
159 0035 0603 A        ROUT    3
160 0036 03F5 A        JSRI    DELAY
161 0037 4CFF A        LI      R0,-1
162 0038 0603 A        ROUT    3
163 0039 03F5 A        JSRI    DELAY
164 003A 0605 A        ROUT    5
165 003B 5DF8 A        SHR     R1,8
166 003C 3481 A        RCPY    R1,R0
167 003D 21DC A        JMP     PGETC+1
168 003E      ;
169 003E 8000 A MASK:  .WORD  X'8000
170 003F      ;
171 003F      ;
172 003F 290B A PGECO: JSR      SAVE
173 0040 2D01 A        JSR      @PGECO
174 0041 21D8 A        JMP      PGETC+1
175 0042      ;
176 0042 7E73 A PGEOA: .WORD  07E73

177 0043      .PAGE

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STTY10

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178 0043      ;
179 0043      ;      TELETYPE INPUT TEST
180 0043      ;
181 0043      ;      RTS 1 - NORMAL RETURN
182 0043      ;      RTS 0 - ATTEMPT TO INPUT
183 0043      ;
184 0043 2907 A INTEST: JSR      SAVE
185 0044 4F00 A      LI        R3,0
186 0045 0406 A      RIN      6
187 0046 5C08 A      SHL      R0,8
188 0047 1201 A      BOC      2,+.2
189 0048 2114 A      JMP      RESTOR
190 0049 2913 A      JSR      RESTOR
191 004A 0201 A      RTS      1
192 004B      ;
193 004B      ;
194 004B      ;      SAVE/RESTORE REGISTERS AND FLAGS ROUTINE
195 004B      ;
196 004B A10B A SAVE:  ST      R0,REG
197 004C A50B A      ST      R1,REG+1
198 004D A90B A      ST      R2,REG+2
199 004E AD0B A      ST      R3,REG+3
200 004F 0080 A      PUSHF
201 0050 4400 A      PULL     R0
202 0051 A10A A      ST      R0,FLAGS
203 0052 4C01 A      LI      R0,1
204 0053 58FF A      ROR      R0,2
205 0054      ;      IF SEL FLAG SET, SELECT WILL BE NEGATIVE
206 0054 A106 A      ST      R0,SELECT
207 0055 8101 A      LD      R0,REG
208 0056 0200 A      RTS
209 0057      ;
210 0057 005B T REG:  .+,+4
211 005B 005C T SELECT: .+,+1
212 005C 005D T FLAGS: .+,+1
213 005D      ;
214 005D 85FA A RESTOR: LD      R1,REG+1
215 005E 89FA A      LD      R2,REG+2
216 005F 8DFA A      LD      R3,REG+3
217 0060 81FB A      LD      R0,FLAGS
218 0061 4000 A      PUSH     R0
219 0062 0280 A      PULLF
220 0063 0A00 A      SFLG     2
221 0064 81F6 A      LD      R0,SELECT      ; IF SELECT NEGATIVE, SET SEL FLAG
222 0065 1B01 A      BOC      NEG,+.2
223 0066 0A80 A      PFLG     2
224 0067 81EF A      LD      R0,REG
225 0068 0200 A      RTS

226 0069      . PAGE
227 0069      ;
228 0069      ;      TELETYPE SYSTEM INITIALIZATION/RESET
229 0069      ;
230 0069 0018 A GPCS   =      018
231 0069 0760 A CPAD:  .WORD   0760
232 006A      ;
233 006A 29E0 A SETPL: JSR      SAVE
234 006B 8DFD A      LD      R3,CPAD
235 006C 0418 A      RIN      GPCS
236 006D 4801 A      AISZ     R0,1
237 006E 2103 A      JMP      LINIT
238 006F 4F38 A RST:   LI      R3,TTYAD

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STTYIO

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239 0070 0605 A      ROUT    5
240 0071 21EB A      JMP     RESTOR
241 0072      ;
242 0072      ;
243 0072 8106 A LINIT: LD      R0,LPUTCA
244 0073 A00D A      ST       R0,0D
245 0074 8105 A      LD      R0,LGETCA
246 0075 A1A3 A      ST       R0,PGETC
247 0076 8104 A      LD      R0,LGECOA
248 0077 A00F A      ST       R0,0F
249 0078 21F6 A      JMP     RST
250 0079      ;
251 0079 0000 T LPUTCA: .WORD  LPUTC
252 007A 03FB A LGETCA: JSRI   TTYSR
253 007B 001D T LGECOA: .WORD  LGECO
254 007C      ;
255 007C      .END

```

***** 0 ERRORS IN ASSEMBLY *****

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CPAD  DELAY  DELAY1 DONE  EA    EB    EC    FLAGS  GETC  GPCS
0069 T FFF5 A FFF6 A 0011 T 0009 A 0016 A 0026 A 005C T 0018 T 0018 A

INTEST LGECO  LGECOA LGETCA LINIT  LP1    LP3    LPUTC  LPUTCA MASK
0043 T 001D T 007B T 007A T 0072 T 0008 T 002C T 0000 T 0079 T 003E T

NEG    PGECO  PGECOA PGETC  PGETCA PPUTC  PPUTCA R0    R1    R2
000B A 003 F T 0042 T 0019 T 001C T 0014 T 0017 T 0000 A 0001 A 0002 A

R3     REG    RESTOR RST    SAVE  SELECT SETPL  TA    TB    TC
0003 A 0057 T 005D T 006F T 004B T 005B T 006A T 0029 A 0012 A 0070 A

TTYAD  TTYSR
0038 A FFFB A

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1A1A D091

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969 052E 3481 A      RCPY      1,0
970 052F 7044 B      SKAZ      0,HFF
971 0530 2102 A      JMP        $12
972 0531 4D64 A      LI         1,100
973 0532 0201 A      RTS         1
974 0533 6432 B $12:  AND        1,H0F
975 0534 5CFC A      SHR         0,4
976 0535 1103 A      BOC        ZRO,$12A
977 0536 490A A      AISZ        1,10
978 0537 48FF A      AISZ        0,-1
979 0538 21FD A      JMP        .-2
980 0539 4900 A $12A: AISZ        1,0
981 053A 0201 A      RTS         1
982 053B 2450 B      JMP        @TYPERR
983 053C 12F0 A $13:  BOC        POS,$11
984 053D 0200 A      RTS

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985 053E                .PAGE    'INPUT ROUTINES'
986 053E                .LOCAL
987 053E                ;
988 053E 885B B KBREAD: LD        2,ADKGET
989 053F 2103 A          JMP        PTR1
990 0540 885A B CRREAD: LD        2,ADCGET
991 0541 2101 A          JMP        PTR1
992 0542 885C B PTREAD: LD        2,ADTGET
993 0543 A81F B PTR1:   ST         2,MODE
994 0544 29E1 A          JSR        CNVRT
995 0545 4D00 A          LI         1,0
996 0546 A427 B          ST         1,COUNT1
997 0547 8C01 B          LD         3,LAST
998 0548 AC16 B          ST         3,SHI
999 0549 EC0C B $1:     SKG        3,SHT39
1000 054A 2101 A          JMP        .+2
1001 054B 210D A          JMP        $3
1002 054C 2C1F B          JSR        @MODE
1003 054D 210D A          JMP        $3A
1004 054E 7816 B          ISZ        SHI
1005 054F 8C09 B          LD         3,ADBUF
1006 0550 2910 A          JSR        STBUF
1007 0551 8C16 B          LD         3,SHI
1008 0552 7C27 B          DSZ        COUNT1
1009 0553 21F5 A          JMP        $1
1010 0554 885C B $7:     LD         2,ADTGET
1011 0555 F81F B          SKNE       2,MODE
1012 0556 2958 A          JSR        $9
1013 0557 7822 B $7A:    ISZ        FNDTST
1014 0558 247A I          JMP        MLINE
1015 0559                ;
1016 0559 2904 A $3:     JSR        BUFULL
1017 055A 8C16 B          LD         3,SHI
1018 055B FC01 B $3A:    SKNE       3,LAST
1019 055C 2458 B          JMP        @START1
1020 055D 21F6 A          JMP        $7
1021 055E                ;
1022 055E 2C57 B BUFULL: JSR        @STYPE
1023 055F 0805 T          .WORD     FULL
1024 0560 0200 A          RTS

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1025 0561                .PAGE    'APPEND EDIT BUFFER ROUTINES'
1026 0561                ;
1027 0561 AC25 B STBUF:  ST         3,PTBUF
1028 0562 4F48 A          LI         3,72
1029 0563 4E00 A          LI         2,0

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1030 0564 4C00 A      LI      0,0
1031 0565 9425 B $2:   LD      1,@PTBUF
1032 0566 7825 B      ISZ     PTBUF
1033 0567 F431 B      SKNE    1,H0D
1034 0568 2105 A      JMP     $2A
1035 0569 7443 B      SKAZ    1,HDF
1036 056A 2908 A      JSR     STDATA
1037 056B C82C B      ADD     2,H01
1038 056C 4BFF A      AISZ    3,-1
1039 056D 21F7 A      JMP     $2
1040 056E 1102 A $2A:   BOC     ZRO,$2B
1041 056F 4D20 A      LI      1,X'20
1042 0570 290A A      JSR     STEBUF
1043 0571 4C0D A $2B:   LI      0,X'0D
1044 0572 210A A      JMP     STEB1
1045 0573          ;
1046 0573 4A00 A STDATA: AISZ    2,0
1047 0574 2101 A      JMP     .+2
1048 0575 2104 A      JMP     STD1
1049 0576 3980 A      RXCH    2,1
1050 0577 C440 B      ADD     1,H80
1051 0578 2902 A      JSR     STEBUF
1052 0579 3981 A      RCPY    2,1
1053 057A 4EFF A STD1:  LI      2,-1
1054 057B          ;
1055 057B 1105 A STEBUF: BOC     ZRO,STEB2
1056 057C 3400 A      RADD    1,0
1057 057D B016 B STEB1: ST      0,@SHI
1058 057E 7816 B      ISZ     SHI
1059 057F 4C00 A      LI      0,0
1060 0580 0200 A      RTS
1061 0581 3400 A STEB2: RADD    1,0
1062 0582 5C08 A      SHL     0,8
1063 0583 0200 A      RTS

1064 0584          .PAGE    'KEY BOARD INPUT ROUTINE'
1065 0584          ;
1066 0584 2C59 B KBG1:   JSR     @TRISTR
1067 0585          ;
1068 0585 4C2D A KBGETC: LI      0,X'2D          ; OUTPUT '-'
1069 0586 2C51 B      JSR     @SPUTC
1070 0587 4C3E A      LI      0,X'3E          ; OUTPUT '>'
1071 0588 2C51 B      JSR     @SPUTC
1072 0589 4C20 A      LI      0,X'20          ; OUTPUT 2 SPACES
1073 058A 2C54 B      JSR     @SO2CH
1074 058B 8C09 B      LD      3,ADBUF
1075 058C AC25 B      ST      3,PTBUF
1076 058D 4E44 A      LI      2,68
1077 058E 2C53 B      JSR     @SGECO
1078 058F F033 B      SKNE    0,H11          ; TEST FOR CNTRL/Q
1079 0590 2459 B      JMP     @TRISTR
1080 0591 2101 A      JMP     .+2
1081 0592 2C53 B $6:    JSR     @SGECO
1082 0593 2923 A      JSR     TTYINP
1083 0594 21EF A      JMP     KBG1
1084 0595 21FC A      JMP     $6
1085 0596 2101 A      JMP     .+2
1086 0597 2C4F B      JSR     @SCRLF
1087 0598 4A04 A      AISZ    2,4
1088 0599 4C20 A $10:   LI      0,X'20
1089 059A A300 A $10A: ST      0,(3)
1090 059B 4B01 A      AISZ    3,1
1091 059C 4AFF A      AISZ    2,-1
1092 059D 21FC A      JMP     $10A
1093 059E 0201 A      RTS     1

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1094 059F .PAGE 'PAPER TAPE INPUT ROUTINE'
1095 059F ;
1096 059F 8C09 B PTGETC: LD 3,ADBUF
1097 05A0 AC25 B ST 3,PTBUF
1098 05A1 4E48 A LI 2,72
1099 05A2 2C52 B JSR @SGETC
1100 05A3 F033 B SKNE 0,H11 ; TEST FOR CNTRL/Q
1101 05A4 210A A JMP $9
1102 05A5 2101 A JMP .+2
1103 05A6 2C52 B $8: JSR @SGETC
1104 05A7 290F A JSR TTYINP
1105 05A8 21AE A JMP $7A
1106 05A9 21FC A JMP $8
1107 05AA 21EE A JMP $10
1108 05AB 2C52 B $8A: JSR @SGETC
1109 05AC F031 B SKNE 0,H0D
1110 05AD 0201 A RTS 1
1111 05AE 21FC A JMP $8A
1112 05AF ;
1113 05AF 2C57 B $9: JSR @STYPE
1114 05B0 07CC T .WORD TPAK2
1115 05B1 4C07 A LI 0,7
1116 05B2 4D0F A LI 1,15
1117 05B3 2C51 B $9A: JSR @SPUTC
1118 05B4 49FF A AISZ 1,-1
1119 05B5 21FD A JMP $9A
1120 05B6 244F B JMP @SCRLF

1121 05B7 .PAGE 'TELETYPE INPUT TEST'
1122 05B7 ;
1123 05B7 F02F B TTYINP: SKNE 0,H09 ; TEST FOR HORIZONTAL TAB
1124 05B8 210F A JMP $4
1125 05B9 F031 B SKNE 0,H0D ; TEST FOR CARRIAGE RETURN
1126 05BA 0202 A RTS 2
1127 05BB F033 B SKNE 0,H11 ; CTRL/Q
1128 05BC 0200 A RTS
1129 05BD F03E B SKNE 0,H5F ; TEST FOR ' '
1130 05BE 2125 A JMP $5
1131 05BF E03E B SKG 0,H5F ; TEST FOR VALID CHARACTER
1132 05C0 E035 B SKG 0,H1F ; ASCII 20 THRU ASCII 5F
1133 05C1 0201 A RTS 1
1134 05C2 A300 A ST 0,(3)
1135 05C3 4B01 A AISZ 3,1
1136 05C4 7825 B ISZ PTBUF
1137 05C5 4AFF A AISZ 2,-1
1138 05C6 0201 A RTS 1
1139 05C7 0203 A RTS 3
1140 05C8 ;
1141 05C8 ; HORIZONTAL TAB ANALYSIS
1142 05C8 ;
1143 05C8 3C81 A $4: RCPY 3,0
1144 05C9 D009 B SUB 0,ADBUF
1145 05CA 4801 A AISZ 0,1
1146 05CB E00F B SKG 0,TAB1
1147 05CC 2105 A JMP $4A
1148 05CD E010 B SKG 0,TAB2
1149 05CE 2105 A JMP $4B
1150 05CF E011 B SKG 0,TAB3
1151 05D0 2105 A JMP $4C
1152 05D1 0201 A RTS 1
1153 05D2 D00F B $4A: SUB 0,TAB1
1154 05D3 2103 A JMP $4D
1155 05D4 D010 B $4B: SUB 0,TAB2

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1156 05D5 2101 A      JMP      $4D
1157 05D6 D011 B $4C:  SUB      0,TAB3
1158 05D7 48FF A $4D:  AISZ     0,-1
1159 05D8 A028 B      ST        0,COUNT2
1160 05D9 4C20 A      LI        0,X'20
1161 05DA 845B B      LD        1,ADKGET
1162 05DB F41F B $4E:  SKNE     1,MODE
1163 05DC 2C51 B      JSR      @SPUTC
1164 05DD A300 A      ST        0,(3)
1165 05DE 4B01 A      AISZ     3,1
1166 05DF 7825 B      ISZ      PTBUF
1167 05E0 4AFF A      AISZ     2,-1
1168 05E1 7828 B      ISZ      COUNT2
1169 05E2 21F8 A      JMP      $4E
1170 05E3 0201 A      RTS      1
1171 05E4          ;
1172 05E4          ;      BACK ARROW INPUT ANALYSIS
1173 05E4          ;
1174 05E4 FC09 B $5:   SKNE     3,ADBUF
1175 05E5 0201 A      RTS      1
1176 05E6 4BFF A      AISZ     3,-1
1177 05E7 7C25 B      DSZ      PTBUF
1178 05E8 4AFF A      AISZ     2,-1
1179 05E9 0201 A      RTS      1
1180 05EA 0203 A      RTS      3

1181 05EB          .PAGE   'CARD READER INPUT ROUTINE'
1182 05EB          ;
1183 05EB 2C57 B INERR: JSR      @STYPE
1184 05EC 07F3 T      .WORD   CRPK1
1185 05ED 0200 A      RTS
1186 05EE 0605 A CRESET: ROUT   RES
1187 05EF 0200 A      RTS
1188 05F0          ;
1189 05F0 4F10 A CRGETC: LI      3,CRADDR
1190 05F1 8009 B      LD        0,ADBUF
1191 05F2 0602 A RDCR:  ROUT   STNDRD      ; READ NEXT CARD
1192 05F3 1C03 A      BOC      POA,WTLOOP
1193 05F4 2C4D B      JSR      @SINTST
1194 05F5 21F8 A      JMP      CRESET
1195 05F6 21FB A      JMP      RDCR
1196 05F7 0401 A WTLOOP: RIN   STATUS
1197 05F8 2C4E B      JSR      @SRESET
1198 05F9 2C4D B      JSR      @SINTST
1199 05FA 21F3 A      JMP      CRESET
1200 05FB 7041 B      SKAZ     0,HC0
1201 05FC 21EE A      JMP      INERR
1202 05FD 5CFE A      SHR      0,2
1203 05FE 14F8 A      BOC      BIT1,WTLOOP      ; BRANCH IF BUSY
1204 05FF 8C09 B CONV:  LD        3,ADBUF
1205 0600          ;
1206 0600          ;      HOLLERITH TO ASCII CONVERSION
1207 0600          ;
1208 0600 4D48 A CHTOA:  LI      1,72
1209 0601 8300 A CHT01:  LD        0,(3)      ;LOAD HOLLERITH CHARACTER
1210 0602 890E A      LD        2,TADDR
1211 0603 F200 A CHT02:  SKNE     0,(2)      ;COMPARE WITH HOLLERITH TABLE
1212 0604 2105 A      JMP      $12A
1213 0605 F90C A      SKNE     2,BADDR
1214 0606 2102 A      JMP      $12
1215 0607 4A01 A      AISZ     2,1
1216 0608 21FA A      JMP      CHT02

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1217 0609      ;
1218 0609 8907 A $12: LD      2,TADDR
1219 060A D906 A $12A: SUB    2,TADDR
1220 060B 4A20 A      AISZ    2,X'20
1221 060C AB00 A      ST      2,(3)      ;SAVE CONVERTED VALUE
1222 060D 4B01 A      AISZ    3,1
1223 060E 49FF A      AISZ    1,-1
1224 060F 21F1 A      JMP     CHT01
1225 0610 0201 A      RTS     1
1226 0611      ;
1227 0611 0778 T TADDR: .WORD   BEGHOL      ;ADDRESS OF HOLLERITH TABLE
1228 0612 07B8 T BADDR: .WORD   BEGHOL+64
1229 0613      ;
1230 0613 8809 B PCRGET: LD      2,ADBUF
1231 0614 2D07 A PCRG1: JSR     @CRP
1232 0615 2103 A      JMP     TERR
1233 0616 2C4D B      JSR     @SINTST
1234 0617 0200 A      RTS     0
1235 0618 21E6 A      JMP     CONV
1236 0619      ;
1237 0619 2C4D B TERR: JSR     @SINTST
1238 061A 0200 A      RTS     0
1239 061B 21F8 A      JMP     PCRG1
1240 061C      ;
1241 061C 7FD3 A CRP:  .WORD   07FD3

1242 061D      .PAGE   'OUTPUT BUFFER ROUTINE'
1243 061D      .LOCAL
1244 061D      ;
1245 061D 8C04 B PUNCHL: LD      3,ADPLN2
1246 061E 2104 A      JMP     PRI2
1247 061F 2102 A TYPEL: JMP     PRI1
1248 0620 885D B PRINTL: LD      2,ADHSP
1249 0621 A80A B      ST      2,DEVICE
1250 0622 8C03 B PRI1: LD      3,ADPLN
1251 0623 AC1F B PRI2: ST      3,MODE
1252 0624 8804 B      LD      2,ADPLN2
1253 0625 F81F B      SKNE    2,MODE
1254 0626 2101 A      JMP     .+2
1255 0627 2103 A      JMP     $8B
1256 0628 2C57 B      JSR     @STYPE
1257 0629 07E0 T      .WORD   TPAK4
1258 062A 2C52 B $8A: JSR     @SGETC
1259 062B 2976 A $8B: JSR     SETLHR
1260 062C 2C1F B $8C: JSR     @MODE
1261 062D FC18 B      SKNE    3,RHI
1262 062E 2101 A      JMP     .+2
1263 062F 21FC A      JMP     $8C
1264 0630 8804 B      LD      2,ADPLN2
1265 0631 F81F B      SKNE    2,MODE
1266 0632 2101 A      JMP     .+2
1267 0633 21F7 A      JMP     $8B
1268 0634 9002 B      LD      0,@PTRBUF
1269 0635 F031 B      SKNE    0,H0D
1270 0636 21F3 A      JMP     $8A
1271 0637 21F3 A      JMP     $8B
1272 0638      ;
1273 0638      ; LIST FIRST/LAST ROUTINE
1274 0638      ;
1275 0638 2C67 I LISTF: JSR     RNGZRO
1276 0639 8C00 B      LD      3,FIRST
1277 063A FC01 B      SKNE    3,LAST

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1278 063B 210D A      JMP      NOFILE
1279 063C 2913 A $8:   JSR      PUTLN
1280 063D 2458 B      JMP      @START1
1281 063E           ;
1282 063E 2C67 I LISTL: JSR      RNGZRO
1283 063F 8C01 B      LD        3, LAST
1284 0640 FC00 B      SKNE      3, FIRST
1285 0641 2107 A      JMP      NOFILE
1286 0642 4C0D A      LI        0, X'0D
1287 0643 4BFF A $9:   AISZ      3, -1
1288 0644 F3FF A      SKNE      0, -1(3)
1289 0645 21F6 A      JMP      $8
1290 0646 FC00 B      SKNE      3, FIRST
1291 0647 21F4 A      JMP      $8
1292 0648 21FA A      JMP      $9
1293 0649           ;
1294 0649 8C01 B NOFILE: LD        3, LAST
1295 064A FC00 B      SKNE      3, FIRST
1296 064B 2101 A      JMP      .+2
1297 064C 247B I      JMP      NUM3
1298 064D 2C57 B      JSR      @STYPE
1299 064E 07D7 T      .WORD     TPAK3
1300 064F 245E B      JMP      @RINIT1

1301 0650           .PAGE     'OUTPUT LINE ROUTINE'
1302 0650           ;
1303 0650 4E04 A PUTLN: LI        2, 4
1304 0651 8700 A      LD        1, (3)
1305 0652 5904 A $1:   ROL        1, 4
1306 0653 7432 B      SKAZ      1, H0F
1307 0654 2102 A      JMP      .+3
1308 0655 4AFF A      AISZ      2, -1
1309 0656 21FB A      JMP      $1
1310 0657 A827 B      ST        2, COUNT1
1311 0658 4AFC A      AISZ      2, -4
1312 0659 2101 A      JMP      .+2
1313 065A 2104 A      JMP      $2
1314 065B 4C20 A      LI        0, X'20
1315 065C 2C0A B      JSR      @DEVICE
1316 065D 4A01 A      AISZ      2, 1
1317 065E 21FD A      JMP      .-2
1318 065F 3481 A $2:   RCPY      1, 0
1319 0660 5904 A      ROL        1, 4
1320 0661 6032 B      AND        0, H0F
1321 0662 4830 A      AISZ      0, X'30
1322 0663 2C0A B      JSR      @DEVICE
1323 0664 7C27 B      DSZ      COUNT1
1324 0665 21F9 A      JMP      $2
1325 0666 4C20 A      LI        0, X'20
1326 0667 2C55 B      JSR      @SO3CH
1327 0668 4E41 A      LI        2, 65
1328 0669 2101 A      JMP      .+2
1329 066A 4E00 A PUTLN2: LI        2, 0
1330 066B 4B01 A      AISZ      3, 1
1331 066C 8300 A $4:   LD        0, (3)
1332 066D 4B01 A      AISZ      3, 1
1333 066E F031 B      SKNE      0, H0D
1334 066F 244F B      JMP      @SCRLF
1335 0670 1201 A      BOC        POS, .+2
1336 0671 291B A      JSR      REPEAT
1337 0672 5808 A      ROL        0, 8
1338 0673 A020 B      ST        0, RGFLG

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1339 0674 6044 B      AND      0,HFF
1340 0675 2C0A B      JSR      @DEVICE
1341 0676 2C4E B      JSR      @SRESET
1342 0677 2C4D B      JSR      @SINTST
1343 0678 2123 A      JMP      RETURN
1344 0679 4AFF A      AISZ     2,-1
1345 067A 2105 A      JMP      $7
1346 067B 8300 A $5:   LD       0,(3)
1347 067C 4B01 A      AISZ     3,1
1348 067D F031 B      SKNE     0,H0D
1349 067E 244F B      JMP      @SCRLF
1350 067F 21FB A      JMP      $5
1351 0680           ;
1352 0680 8020 B $7:   LD       0,RGFLG
1353 0681 1201 A      BOC      POS,+.2
1354 0682 290A A      JSR      REPEAT
1355 0683 5808 A      ROL      0,8
1356 0684 2100 A      JMP      .+1
1357 0685 6044 B      AND      0,HFF
1358 0686 2C0A B      JSR      @DEVICE
1359 0687 2C4E B      JSR      @SRESET
1360 0688 2C4D B      JSR      @SINTST
1361 0689 2112 A      JMP      RETURN
1362 068A 4AFF A      AISZ     2,-1
1363 068B 21E0 A      JMP      $4
1364 068C 21EE A      JMP      $5
1365 068D           ;
1366 068D 5808 A REPEAT: ROL      0,8
1367 068E A020 B      ST       0,RGFLG
1368 068F 603F B      AND      0,H7F
1369 0690 3181 A      RCPY     0,1
1370 0691 4C20 A      LI       0,X'20
1371 0692 2C0A B REPl: JSR      @DEVICE
1372 0693 2C4E B      JSR      @SRESET
1373 0694 2C4D B      JSR      @SINTST
1374 0695 2106 A      JMP      RETURN
1375 0696 4AFF A      AISZ     2,-1
1376 0697 2101 A      JMP      .+2
1377 0698 0209 A      RTS      9
1378 0699 49FF A      AISZ     1,-1
1379 069A 21F7 A      JMP      REPl
1380 069B 0208 A      RTS      8
1381 069C           ;
1382 069C 8004 B RETURN: LD       0,ADPLN2
1383 069D F01F B      SKNE     0,MODE
1384 069E 2C52 B      JSR      @SGETC
1385 069F 8051 B      LD       0,SPUTC
1386 06A0 A00A B      ST       0,DEVICE
1387 06A1 2141 A      JMP      REINIT

1388 06A2           .PAGE     'SET LO AND HI RANGE'
1389 06A2           ;
1390 06A2 2956 A SETLHR: JSR      EXPZRO
1391 06A3 290F A SET1:  JSR      STLOHI
1392 06A4 2479 I      JMP      NUMBER
1393 06A5 8017 B      LD       0,RLO
1394 06A6 1507 A      BOC      NZRO,SET2
1395 06A7 8C01 B      LD       3,LAST
1396 06A8 AC18 B      ST       3,RHI
1397 06A9 8C00 B      LD       3,FIRST
1398 06AA FC01 B      SKNE     3,LAST
1399 06AB 219D A      JMP      NOFILE

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1400 06AC 7822 B      ISZ      FNDTST
1401 06AD 0200 A      RTS
1402 06AE 2916 A SET2: JSR      SRCHRG
1403 06AF 21F3 A      JMP      SET1
1404 06B0 7822 B      ISZ      FNDTST
1405 06B1 8C17 B      LD        3,RLO
1406 06B2 0200 A      RTS
1407 06B3          ;
1408 06B3 4C00 A STLOHI: LI      0,0
1409 06B4 4E02 A      LI        2,2
1410 06B5 A017 B SETL01: ST      0,RLO
1411 06B6 9002 B      LD        0,@PTRBUF
1412 06B7 F031 B      SKNE      0,H0D
1413 06B8 0200 A      RTS
1414 06B9 F049 B      SKNE      0,HFFFF
1415 06BA 2104 A      JMP      STL02
1416 06BB A018 B      ST        0,RHI
1417 06BC 7802 B      ISZ      PTRBUF
1418 06BD 4AFF A      AISZ      2,-1
1419 06BE 21F6 A      JMP      SETL01
1420 06BF 7802 B STL02: ISZ      PTRBUF
1421 06C0 0201 A      RTS        1

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1422 06C1          .PAGE      'SEARCH ROUTINES'
1423 06C1          ;
1424 06C1 290B A SRCHLN: JSR      SRCHLO
1425 06C2 2916 A      JSR      ANDH0D
1426 06C3 AC18 B SLN1:  ST      3,RHI
1427 06C4 0201 A      RTS        1
1428 06C5          ;
1429 06C5 2907 A SRCHRG: JSR      SRCHLO
1430 06C6 2912 A SRG1:  JSR      ANDH0D
1431 06C7 FC01 B      SKNE      3,LAST
1432 06C8 21FA A      JMP      SLN1
1433 06C9 8300 A      LD        0,(3)
1434 06CA E018 B      SKG       0,RHI
1435 06CB 21FA A      JMP      SRG1
1436 06CC 21F6 A      JMP      SLN1
1437 06CD          ;
1438 06CD 8C00 B SRCHLO: LD        3,FIRST
1439 06CE FC01 B SL01:  SKNE      3,LAST
1440 06CF 246D I      JMP      NOFILE
1441 06D0 8300 A      LD        0,(3)
1442 06D1 E017 B      SKG       0,RLO
1443 06D2 F017 B      SKNE      0,RLO
1444 06D3 2102 A      JMP      SL02
1445 06D4 2904 A      JSR      ANDH0D
1446 06D5 21F8 A      JMP      SL01
1447 06D6 AC17 B SL02:  ST      3,RLO
1448 06D7 7822 B      ISZ      FNDTST
1449 06D8 0200 A      RTS

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1450 06D9          .PAGE
1451 06D9          ;
1452 06D9 4B01 A ANDH0D: AISZ      3,1
1453 06DA 8300 A AND1:  LD        0,(3)
1454 06DB 4B01 A      AISZ      3,1
1455 06DC 48F3 A      AISZ      0,-X'0D
1456 06DD 21FC A      JMP      AND1
1457 06DE 0200 A      RTS
1458 06DF          ;
1459 06DF 6032 B ANDH0A: AND      0,H0F
1460 06E0 48F6 A      AISZ      0,-X'0A

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1461 06E1 4400 A      PULL      0
1462 06E2 0200 A      RTS

1463 06E3              .PAGE      'REINITIALIZATION ROUTINES'
1464 06E3              ;
1465 06E3 290B A REINIT: JSR      SPATSK
1466 06E4 4D10 A RNIT1: LI       1,16
1467 06E5 4400 A      PULL      0
1468 06E6 49FF A      AISZ      1,-1
1469 06E7 21FD A      JMP       -2
1470 06E8 2458 B      JMP       @START1
1471 06E9              ;
1472 06E9 2912 A WAITCR: JSR      GETCO
1473 06EA 48F3 A WAIT1: AISZ      0,-X'0D
1474 06EB 21FD A      JMP       -2
1475 06EC 2913 A WAIT2: JSR      TYPE
1476 06ED 080D T      .WORD     ERROR
1477 06EE 21F5 A      JMP       RNIT1
1478 06EF              ;
1479 06EF 4C20 A SPATSK: LI       0,X'20
1480 06F0 291B A      JSR       O2CH
1481 06F1 4C2A A      LI       0,X'2A
1482 06F2 2918 A      JSR       O3CH
1483 06F3 4C0D A CRLF: LI       0,X'0D
1484 06F4 2C0A B      JSR       @DEVICE
1485 06F5 4C0A A      LI       0,X'0A
1486 06F6 240A B      JMP       @DEVICE
1487 06F7              ;
1488 06F7 8024 B RNGZRO: LD       0,RNGTST
1489 06F8 15F3 A      BOC       NZRO,WAIT2
1490 06F9 8021 B EXPZRO: LD       0,EXPTST
1491 06FA 15F1 A      BOC       NZRO,WAIT2
1492 06FB 0200 A      RTS

1493 06FC              .PAGE      'SPECIAL I/O ROUTINES'
1494 06FC              ;
1495 06FC 2C53 B GETCO: JSR      @SGECO
1496 06FD F033 B      SKNE      0,H11          ; CNTRL/Q
1497 06FE 21E4 A      JMP       REINIT
1498 06FF 0200 A      RTS
1499 0700              ;
1500 0700 4700 A TYPE: PULL      3
1501 0701 4300 A      PUSH     3
1502 0702 8F00 A      LD       3,(3)
1503 0703 8300 A TYP1: LD       0,(3)
1504 0704 4B01 A      AISZ      3,1
1505 0705 1121 A      BOC       ZRO,RET1
1506 0706 5808 A      ROL       0,8
1507 0707 2C51 B      JSR      @SPUTC
1508 0708 5808 A      ROL       0,8
1509 0709 2C51 B      JSR      @SPUTC
1510 070A 21F8 A      JMP       TYP1
1511 070B              ;
1512 070B 2C0A B O3CH: JSR      @DEVICE
1513 070C 2C0A B O2CH: JSR      @DEVICE
1514 070D 240A B      JMP       @DEVICE

1515 070E              .PAGE      'HIGH SPEED PRINTER ROUTINE'
1516 070E              ;
1517 070E 2907 A HSPRT: JSR      SAVE

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1518 070F 4F48 A      LI      3,HSPAD
1519 0710 0607 A      ROUT    7
1520 0711 1C01 A      BOC     POA,.,+2
1521 0712 21FD A      JMP     .-2
1522 0713 0401 A      RIN     STATUS
1523 0714 1406 A      BOC     BIT1,RESTOR
1524 0715 21FD A      JMP     .-2

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1525 0716                .PAGE   'SAVE/RESTORE REGISTERS ROUTINE'
1526 0716                ;
1527 0716 A019 B SAVE:   ST      0,REG
1528 0717 A41A B        ST      1,REG+1
1529 0718 A81B B        ST      2,REG+2
1530 0719 AC1C B        ST      3,REG+3
1531 071A 0200 A        RTS
1532 071B                ;
1533 071B 8019 B RESTOR: LD      0,REG
1534 071C 841A B        LD      1,REG+1
1535 071D 881B B        LD      2,REG+2
1536 071E 8C1C B        LD      3,REG+3
1537 071F 0200 A        RTS

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1538 0720                .PAGE   'TELETYPE INTERRUPT/RESET ROUTINE'
1539 0720                ;
1540 0720                ;      TELETYPE INTERRUPT TEST
1541 0720                ;
1542 0720                ;      RTS 0 - INTERRUPT
1543 0720                ;      RTS 1 - NORMAL RETURN
1544 0720                ;
1545 0720 29F5 A INTEST: JSR     SAVE
1546 0721 4F00 A      LI      3,0
1547 0722 0406 A      RIN     6
1548 0723 5C08 A      SHL     0,8
1549 0724 1201 A      BOC     POS,.,+2
1550 0725 21F5 A      JMP     RESTOR
1551 0726 29F4 A      JSR     RESTOR
1552 0727 0201 A RET1:   RTS     1
1553 0728                ;
1554 0728                ;      TELETYPE RESET ROUTINE
1555 0728                ;
1556 0728 29ED A RESET: JSR     SAVE
1557 0729 4F38 A      LI      3,TTYAD
1558 072A 0605 A RESET2: ROUT    RES
1559 072B 21EF A      JMP     RESTOR

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1560 072C                .PAGE   'TELETYPE I/O ROUTINES'
1561 072C                ;
1562 072C                ;      TELETYPE RECEIVE CHARACTER ROUTINE
1563 072C                ;
1564 072C 29E9 A GETC:   JSR     SAVE
1565 072D 03FB A      JSRI    TTYSR
1566 072E 603F B GTC1:  AND     0,H7F
1567 072F A019 B      ST      0,REG
1568 0730 21F9 A      JMP     RESET2
1569 0731                ;
1570 0731 29E4 A PGETC: JSR     SAVE
1571 0732 2D01 A      JSR     @.+2
1572 0733 21FA A      JMP     GTC1
1573 0734 7E3B A      .WORD   07E3B

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1574 0735 .PAGE
1575 0735 ;
1576 0735 ; TELETYPE GET AND ECHO CHARACTER ROUTINE
1577 0735 ;
1578 0735 29E0 A GEEO: JSR SAVE
1579 0736 4F38 A LI 3,TTYAD
1580 0737 0605 A ROUT RES
1581 0738 4E08 A LP2: LI 2,8 ;INITIALIZE BIT COUNT
1582 0739 0604 A ROUT RDREN ;ENABLE READER
1583 073A 0402 A RIN READ
1584 073B 1201 A BOC POS,.,+2 ;TEST FOR START BIT
1585 073C 21FD A JMP .-2
1586 073D 4C09 A LI 0,EA
1587 073E 03F6 A JSRI DELAY1
1588 073F 58EA A ROR 0,EB
1589 0740 0402 A RIN READ ;TEST IF START BIT STILL THERE
1590 0741 1201 A BOC POS,.,+2 ;START IF GOOD START BIT
1591 0742 21F5 A JMP LP2
1592 0743 0603 A LP3: ROUT SEND ;ECHO BIT
1593 0744 03F5 A JSRI DELAY
1594 0745 5826 A ROL 0,EC
1595 0746 0402 A RIN READ
1596 0747 6048 B AND 0,H8000 ;MASK UNWANTED BITS
1597 0748 5DFF A SHR 1,1
1598 0749 3182 A RXOR 0,1 ;ADD NEW BIT TO DATA
1599 074A 4AFF A AISZ 2,-1
1600 074B 21F7 A JMP LP3
1601 074C 0603 A ROUT SEND ;ECHO LAST BIT
1602 074D 03F5 A JSRI DELAY
1603 074E 4CFF A LI 0,-1
1604 074F 0603 A ROUT SEND ;SEND STOP BIT
1605 0750 03F5 A JSRI DELAY
1606 0751 0605 A ROUT RES
1607 0752 5DF8 A SHR 1,8
1608 0753 3481 A RCPY 1,0
1609 0754 29D9 A LP4: JSR GTC1
1610 0755 F031 B SKNE 0,H0D
1611 0756 2903 A JSR SENDLF
1612 0757 F030 B SKNE 0,H0A
1613 0758 2103 A JMP SENDCR
1614 0759 0200 A RTS
1615 075A ;
1616 075A 4C0A A SENDLF: LI 0,X'0A
1617 075B 2C51 B JSR @SPUTC
1618 075C 4C0D A SENDCR: LI 0,X'0D
1619 075D 2451 B JMP @SPUTC
1620 075E ;
1621 075E 29B7 A PGECO: JSR SAVE
1622 075F 2D01 A JSR @.+2
1623 0760 21F3 A JMP LP4
1624 0761 7E73 A .WORD 07E73

1625 0762 .PAGE
1626 0762 ;
1627 0762 ; TELETYPE TRANSMIT CHARACTER ROUTINE
1628 0762 ;
1629 0762 29B3 A PUTC: JSR SAVE
1630 0763 3181 A RCPY 0,1
1631 0764 4C30 A LI 0,X'30
1632 0765 03F6 A JSRI DELAY1
1633 0766 4E09 A LI 2,9 ;LOAD BIT COUNT
1634 0767 4F38 A LI 3,TTYAD
1635 0768 0603 A ROUT SEND

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1636 0769 03F5 A LP1: JSRI DELAY
1637 076A 5829 A ROL 0,TA
1638 076B 4AFF A AISZ 2,-1
1639 076C 2101 A JMP .+2
1640 076D 2104 A JMP DONE
1641 076E 59FF A ROR 1,1
1642 076F 3481 A RCPY 1,0
1643 0770 0603 A ROUT SEND
1644 0771 21F7 A JMP LP1
1645 0772 ;
1646 0772 4CFF A DONE: LI 0,-1
1647 0773 0603 A ROUT SEND ;SEND STOP BIT
1648 0774 21B5 A JMP RESET2
1649 0775 ;
1650 0775 2D01 A PPUTC: JSR @.+2
1651 0776 0200 A RTS
1652 0777 7E59 A .WORD 07E59

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1653 0778 .PAGE 'HOLLERITH TABLE'
1654 0778 ;
1655 0778 0800 A C12 = 2048
1656 0778 0400 A C11 = 1024
1657 0778 0200 A C0 = 512
1658 0778 0100 A C1 = 256
1659 0778 0080 A C2 = 128
1660 0778 0040 A C3 = 64
1661 0778 0020 A C4 = 32
1662 0778 0010 A C5 = 16
1663 0778 0008 A C6 = 8
1664 0778 0004 A C7 = 4
1665 0778 0002 A C8 = 2
1666 0778 0001 A C9 = 1
1667 0778 ;
1668 0778 0000 A BEGHOL: .WORD 0 ; BLANK/SPACE
1669 0779 ;
1670 0779 ;
1671 0779 0482 A .WORD ! " # $
      077A 0006 A C11+C2+C8,C7+C8,C3+C8,C11+C3+C8
      077B 0042 A
      077C 0442 A
1672 077D ;
1673 077D ;
1674 077D 0222 A .WORD % & ' (
      077E 0800 A C0+C4+C8,C12,C5+C8,C12+C5+C8
      077F 0012 A
      0780 0812 A
1675 0781 ;
1676 0781 ;
1677 0781 0412 A .WORD ) * +
      0782 0422 A C11+C5+C8,C11+C4+C8,C12+C6+C8
      0783 080A A
1678 0784 ;
1679 0784 ;
1680 0784 0242 A .WORD , - . / 0 1 2
      0785 0400 A C0+C3+C8,C11,C12+C3+C8,C0+C1,C0,C1,C2
      0786 0842 A
      0787 0300 A
      0788 0200 A
      0789 0100 A
      078A 0080 A
1681 078B ;
1682 078B ;
1683 078B 0040 A .WORD 3 4 5 6 7 8 9 : ;
      078C 0020 A C3,C4,C5,C6,C7,C8,C9,C2+C8,C11+C6+C8
      078D 0010 A
      078E 0008 A

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078F 0004 A
0790 0002 A
0791 0001 A
0792 0082 A
0793 040A A
1684 0794 ;
1685 0794 ;
1686 0794 0822 A .WORD < C12+C4+C8, = C6+C8, > C0+C6+C8, ? C0+C7+C8
0795 000A A
0796 020A A
0797 0206 A
1687 0798 ;
1688 0798 ;
1689 0798 0022 A .WORD @ C4+C8, A C12+C1, B C12+C2, C C12+C3, D C12+C4
0799 0900 A
079A 0880 A
079B 0840 A
079C 0820 A
1690 079D ;
1691 079D ;
1692 079D 0810 A .WORD E C12+C5, F C12+C6, G C12+C7, H C12+C8, I C12+C9
079E 0808 A
079F 0804 A
07A0 0802 A
07A1 0801 A
1693 07A2 ;
1694 07A2 ;
1695 07A2 0500 A .WORD J C11+C1, K C11+C2, L C11+C3, M C11+C4, N C11+C5
07A3 0480 A
07A4 0440 A
07A5 0420 A
07A6 0410 A
1696 07A7 ;
1697 07A7 ;
1698 07A7 0408 A .WORD O C11+C6, P C11+C7, Q C11+C8, R C11+C9, S C0+C2
07A8 0404 A
07A9 0402 A
07AA 0401 A
07AB 0280 A
1699 07AC ;
1700 07AC ;
1701 07AC 0240 A .WORD T C0+C3, U C0+C4, V C0+C5, W C0+C6, X C0+C7, Y C0+C8
07AD 0220 A
07AE 0210 A
07AF 0208 A
07B0 0204 A
07B1 0202 A
1702 07B2 ;
1703 07B2 ;
1704 07B2 0201 A .WORD Z C0+C9, % C12+C2+C8, % C0+C8+C2, \ C12+C7+C8
07B3 0882 A
07B4 0282 A
07B5 0806 A
1705 07B6 ;
1706 07B6 ;
1707 07B6 0406 A .WORD ~ C11+C7+C8, C0+C5+C8, C8+C1
07B7 0212 A
07B8 0102 A

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1708 07B9          .PAGE  'LIST OF MESSAGES'
1709 07B9          ;
1710 07B9 0D0A A TPAK1: .WORD  0D0A
1711 07BA 0D0A A      .WORD  0D0A
1712 07BB 0D0A A      .WORD  0D0A
1713 07BC 4E53 A      .ASCII  'NSC EDIT16 REV C'
      07BD 4320 A
      07BE 2045 A
      07BF 4449 A
      07C0 5431 A
      07C1 3620 A
      07C2 2052 A
      07C3 4556 A
      07C4 2043 A
1714 07C5 0D0A A      .WORD  0D0A
1715 07C6 4D45 A      .ASCII  'MEMORY:'
      07C7 4D4F A
      07C8 5259 A
      07C9 3A20 A
1716 07CA 2000 A      .WORD  02000
1717 07CB 0000 A      .WORD  0
1718 07CC          ;
1719 07CC          ;
1720 07CC 5455 A TPAK2: .ASCII  'TURN READER OFF NOW'
      07CD 524E A
      07CE 2052 A
      07CF 4541 A
      07D0 4445 A
      07D1 5220 A
      07D2 4F46 A
      07D3 4620 A
      07D4 4E4F A
      07D5 5720 A
1721 07D6 0000 A      .WORD  0
1722 07D7          ;
1723 07D7          ;
1724 07D7 4E4F A TPAK3: .ASCII  'NO ACTIVE FILE'
      07D8 2041 A
      07D9 4354 A
      07DA 4956 A
      07DB 4520 A
      07DC 4649 A
      07DD 4C45 A
1725 07DE 0D0A A      .WORD  0D0A
1726 07DF 0000 A      .WORD  0
1727 07E0          ;
1728 07E0          ;
1729 07E0 5455 A TPAK4: .ASCII  'TURN PUNCH ON'
      07E1 524E A
      07E2 2050 A
      07E3 554E A
      07E4 4348 A
      07E5 204F A
      07E6 4E20 A
1730 07E7 0D0A A      .WORD  0D0A
1731 07E8 0000 A      .WORD  0
1732 07E9          ;
1733 07E9          ;
1734 07E9 5645 A VERIFY: .ASCII  'VERIFY'
      07EA 5249 A
      07EB 4659 A
1735 07EC 3F00 A      .WORD  03F00
1736 07ED 0000 A      .WORD  0
1737 07EE          ;

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1738 07EE ;
1739 07EE 2053 A TYPE1: .ASCII ' START'
      07EF 5441 A
      07F0 5254 A
1740 07F1 3F00 A .WORD 03F00
1741 07F2 0000 A .WORD 0
1742 07F3 ;
1743 07F3 ;
1744 07F3 5452 A CRPK1: .ASCII 'TRANSMISSION ERROR'
      07F4 414E A
      07F5 534D A
      07F6 4953 A
      07F7 5349 A
      07F8 4F4E A
      07F9 2045 A
      07FA 5252 A
      07FB 4F52 A
1745 07FC 0D0A A .WORD 0D0A
1746 07FD 0000 A .WORD 0
1747 07FE ;
1748 07FE ;
1749 07FE 564F A VOID: .ASCII 'VOID RANGE'
      07FF 4944 A
      0800 2052 A
      0801 414E A
      0802 4745 A
1750 0803 0D0A A .WORD 0D0A
1751 0804 0000 A .WORD 0
1752 0805 ;
1753 0805 ;
1754 0805 4255 A FULL: .ASCII 'BUFFER FULL'
      0806 4646 A
      0807 4552 A
      0808 2046 A
      0809 554C A
      080A 4C20 A
1755 080B 0D0A A .WORD 0D0A
1756 080C 0000 A .WORD 0
1757 080D ;
1758 080D ;
1759 080D 4552 A ERROR: .ASCII 'ERROR'
      080E 524F A
      080F 5220 A
1760 0810 0D0A A .WORD 0D0A
1761 0811 0000 A .WORD 0
1762 0812 ;
1763 0812 ;
1764 0812 414C A ALTERS: .ASCII 'ALTERS'
      0813 5445 A
      0814 5253 A
1765 0815 3F00 A .WORD 03F00
1766 0816 0000 A .WORD 0
1767 0817 4C49 A LINLEN: .ASCII 'LINE IS MAX LENGTH'
      0818 4E45 A
      0819 2049 A
      081A 5320 A
      081B 4D41 A
      081C 5820 A
      081D 4C45 A
      081E 4E47 A
      081F 5448 A
1768 0820 0D0A A .WORD 0D0A
1769 0821 0000 A .WORD 0

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1770 0822          .PAGE   'INDIRECT POINTERS & SYMBOL TABLE'
1771 0822 0250 T BUF: .END   START
POINTERS GENERATED
0063 0344 T
0064 06E9 T
0065 06EA T
0066 02B9 T
0067 06F7 T
0068 06F9 T
0069 06B3 T
006A 06C5 T
006B 06D9 T
006C 06DF T
006D 0649 T
006E 06A2 T
006F 0716 T
0070 071B T
0071 055E T
0072 04BD T
0073 0561 T
0074 04CD T
0075 05B7 T
0076 06E3 T
0077 040B T
0078 06C1 T
0079 0373 T
007A 04A9 T
007B 0375 T

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*****      0 ERRORS IN ASSEMBLY      *****
$1"   $1#   $1$   $1%   $1&   $1'   $10"   $10$   $10&   $10A"
0346 T 0369 T 03CD T 04E2 T 0549 T 0652 T 030D T 045E T 0599 T 0315 T

$10A$ $10A& $11$ $11% $11A$ $12" $12$ $12% $12& $12A$
0463 T 059A T 046A T 052D T 046D T 031A T 0477 T 0533 T 0609 T 0486 T

$12A% $12A& $12B$ $12C$ $13! $13$ $13% $1A% $2" $2#
0539 T 060A T 048A T 0479 T 02C9 T 048E T 053C T 04E6 T 0353 T 0370 T

$2$   $2%   $2&   $2'   $2A$ $2A& $2B& $3!   $3"   $3$
03D3 T 04EF T 0565 T 065F T 03D4 T 056E T 0571 T 026D T 0359 T 039B T

$3%   $3&   $3A$ $3A& $3B$ $3C$ $4!   $4"   $4$   $4%
04FC T 0559 T 03A3 T 055B T 03A4 T 03A6 T 0275 T 032C T 03E1 T 0500 T

$4&   $4'   $4A! $4A" $4A& $4B& $4C& $4D& $4E& $5!
05C8 T 066C T 0276 T 032D T 05D2 T 05D4 T 05D6 T 05D7 T 05DB T 0266 T

$5"   $5%   $5&   $5'   $6!   $6"   $6$   $6&   $6A$ $6B$
0336 T 0511 T 05E4 T 067B T 026B T 033C T 041C T 0592 T 0421 T 0429 T

$7"   $7$   $7&   $7'   $71$ $7A$ $7A& $8"   $8$   $8&
02F5 T 043F T 0554 T 0680 T 044C T 0456 T 0557 T 0304 T 0499 T 05A6 T

$8'   $8A& $8A' $8B' $8C' $9"   $9$   $9&   $9'   $9A&
063C T 05AB T 062A T 062B T 062C T 0308 T 04A2 T 05AF T 0643 T 05B3 T

ADBUF  ADBUF2 ADCGET ADDBUF ADHSP  ADKGET ADPLN  ADPLN2 ADRBUF ADSETB
0009 B 0008 B 005A B 0007 B 005D B 005B B 0003 B 0004 B 0006 B 0005 B

ADTAB  ADTGET ALTERS AND1  ANDH0A ANDH0D ASCFS  ASCMS  BADDR  BEGHOL
000E B 005C B 0812 T 06DA T 06DF T 06D9 T 004B B 004A B 0612 T 0778 T

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EDIT16

BIT1	BUF	BUF1	BUF2	BUFULL	C0	C1	C11	C12	C2
0004 A	0822 T	01B5 T	013C T	055E T	0200 A	0100 A	0400 A	0800 A	0080 A
C3	C4	C5	C6	C7	C8	C9	CHT01	CHT02	CHTOA
0040 A	0020 A	0010 A	0008 A	0004 A	0002 A	0001 A	0601 T	0603 T	0600 T
CLRBUFF	CMDTBL	CMND	CNVRT	CONV	COP1	COP2	COPYLN	COUNT1	COUNT2
035C T	02CE T	001D B	0526 T	05FF T	0495 T	0496 T	0490 T	0027 B	0028 B
CPAD	CRADDR	CRESET	CRGETC	CRLF	CRP	CRPK1	CRREAD	DBUF	DEL1
004C B	0010 A	05EE T	05F0 T	06F3 T	061C T	07F3 T	0540 T	0135 T	0361 T
DELAY	DELAY1	DELELN	DEVICE	DONE	DSH1	DSHIFT	EA	EB	EC
FFF5 A	FFF6 A	0360 T	000A B	0772 T	04D3 T	04CD T	0009 A	0016 A	0026 A
END	ENDTBL	ERROR	EXPMND	EXPTST	EXPZRO	FIRST	FNDSTR	FNDTST	FULL
000D B	02F1 T	080D T	001E B	0021 B	06F9 T	0000 B	038D T	0022 B	0805 T
GECO	GETC	GETCO	GETDEC	GETMEM	GETS1	GETS2	GETSTR	GLLEN	GPCS
0735 T	072C T	06FC T	0344 T	0278 T	0328 T	0329 T	0321 T	0451 T	0018 A
GTC1	H01	H03	H04	H09	H0A	H0D	H0F	H100	H11
072E T	002C B	002D B	002E B	002F B	0030 B	0031 B	0032 B	0045 B	0033 B
H18	H1F	H1F00	H20	H27	H2C	H2F	H39	H40	H54
0034 B	0035 B	0047 B	0036 B	0037 B	0038 B	0039 B	003A B	003B B	003C B
H5A	H5F	H600	H7F	H80	H8000	HC0	HDF	HF0	HFF
003D B	003E B	0046 B	003F B	0040 B	0048 B	0041 B	0043 B	0042 B	0044 B
HFFFF	HSPAD	HSPRT	INCONE	INERR	INTEST	JMPT1	JMPTBL	KBG1	KBGETC
0049 B	0048 A	070E T	0380 T	05EB T	0720 T	02BB T	02B9 T	0584 T	0585 T
KBMODE	KBREAD	LAST	LCRGET	LEADTR	LGECO	LGETC	LINIT	LINLEN	LISTF
02DA T	053E T	0001 B	0062 B	0519 T	0061 B	0060 B	0284 T	0817 T	0638 T
LISTL	LLEN	LLEN1	LLIM	LP1	LP2	LP3	LP4	LPUTC	MAXSTR
063E T	0029 B	002A B	0014 B	0769 T	0738 T	0743 T	0754 T	005F B	0012 B
MAXTS	MLIN1	MLINE	MOD	MOD1	MODE	MODI	MODI2	MODIFY	MODLN
0013 B	04B2 T	04A9 T	040B T	03AD T	001F B	03ED T	040A T	03E8 T	03A9 T
MODSTR	MOV1	MOVELN	NEG	NOFILE	NUM1	NUM2	NUM3	NUMBER	NUMTST
038F T	04A6 T	04A4 T	000B A	0649 T	0378 T	037A T	0375 T	0373 T	0023 B
NZRO	O2CH	O3CH	ODD	OPER	OUT1	OUTBUF	PCRG1	PCRGET	PGECO
0005 A	070C T	070B T	0003 A	0026 B	03BE T	03BD T	0614 T	0613 T	075E T
PGETC	POA	POS	PPUTC	PRI1	PRI2	PRINTL	PROMPT	PTBUF	PTGETC
0731 T	000C A	0002 A	0775 T	0622 T	0623 T	0620 T	028F T	0025 B	059F T
PTR1	PTRBUF	PTHREAD	PUNCHL	PUTC	PUTLN	PUTLN2	RBMAX	RBUF	RDCR
0543 T	0002 B	0542 T	061D T	0762 T	0650 T	066A T	000B B	0120 T	05F2 T
RDREN	READ	REG	REINIT	REP1	REPEAT	RES	RESET	RESET2	RESTOR
0004 A	0002 A	0019 B	06E3 T	0692 T	068D T	0005 A	0728 T	072A T	071B T
RET1	RETURN	RGFLG	RHI	RINIT1	RLO	RNGE	RNGE1	RNGTST	RNGZRO
0727 T	069C T	0020 B	0018 B	005E B	0017 B	02F2 T	02F3 T	0024 B	06F7 T
RNIT1	SAVE	SCRLF	SEND	SENDCR	SENDLF	SET1	SET2	SETBUF	SETL01
06E4 T	0716 T	004F B	0003 A	075C T	075A T	06A3 T	06AE T	03B9 T	06B5 T
SETLHR	SETLN	SETSR	SETT1	SETTAB	SGECO	SGETC	SGETCO	SHI	SHT39

EDIT16

```

06A2 T 03B3 T 04B5 T 04DA T 04D9 T 0053 B 0052 B 0056 B 0016 B 000C B

SINTST SL01 SL02 SLN1 SLO SO2CH SO3CH SPATSK SPUTC SRCH1
004D B 06CE T 06D6 T 06C3 T 0015 B 0054 B 0055 B 06EF T 0051 B 03C8 T

SRCHLN SRCHLO SRCHRG SRCHST SRESET SRG1 START START1 STATUS STBUF
06C1 T 06CD T 06C5 T 03C6 T 004E B 06C6 T 0250 T 0058 B 0001 A 0561 T

STD1 STDATA STEB1 STEB2 STEBUF STL02 STLOHI STNDRD STRB2 STRBUF
057A T 0573 T 057D T 0581 T 057B T 06BF T 06B3 T 0002 A 031E T 031C T

STYPE TA TAB1 TAB2 TAB3 TADDR TERR TERRNG TESTCZ TPAK1
0057 B 0029 A 000F B 0010 B 0011 B 0611 T 0619 T 0316 T 0430 T 07B9 T

TPAK2 TPAK3 TPAK4 TRISTR TSTINT TSTT1 TSTT2 TSTTAB TTYAD TTYINP
07CC T 07D7 T 07E0 T 0059 B 02C1 T 0509 T 050A T 0504 T 0038 A 05B7 T

TTYSR TYP1 TYPE TYPE1 TYPEL TYPERR USH1 USH2 USHIFT VERIFY
FFFB A 0703 T 0700 T 07EE T 061F T 0050 B 04C5 T 04CB T 04BD T 07E9 T

VOID WAIT1 WAIT2 WAITCR WTLOOP ZERO ZRO
07FE T 06EA T 06EC T 06E9 T 05F7 T 002B B 0001 A

```

0C0E C3CB

1

EDIT16

EDIT16

REVISION-G 05/16/74
 EDIT16 00332C 10/18/74 ECO #IMP-2276

```

1 0000 .TITLE EDIT16,'00332C 10/18/74'
2 0000 ;
3 0000 ; CONDITIONAL CODES FOR THE BOC INSTRUCTION
4 0000 ;
5 0000 0001 A ZRO = 1
6 0000 0002 A POS = 2
7 0000 0003 A ODD = 3
8 0000 0004 A BIT1 = 4
9 0000 0005 A NZRO = 5
10 0000 000B A NEG = 11
11 0000 000C A POA = 12
12 0000 ;
13 0000 ; EXPRESSIONS FOR THE TELETYPE I/O
14 0000 ;
15 0000 0009 A EA = 9
16 0000 0016 A EB = 22
17 0000 0026 A EC = 38
18 0000 0029 A TA = 41
19 0000 0038 A TTYAD = 7*8
20 0000 FFF5 A DELAY = 0FFF5
21 0000 FFF6 A DELAY1 = 0FFF6
22 0000 FFFB A TTYSR = 0FFFB
23 0000 0018 A GPCS = 018
24 0000 0002 A READ = 2
25 0000 0003 A SEND = 3
26 0000 0004 A RDREN = 4
27 0000 0005 A RES = 5

28 0000 .PAGE 'CARD READER AND HIGH SPEED PRINTER I/O CONSTANTS'
29 0000 ;
30 0000 ; EXPRESSIONS FOR THE CARD READER I/O
31 0000 ;
32 0000 0001 A STATUS = 1
33 0000 0002 A STNDRD = 2
34 0000 0010 A CRADDR = 2*8
35 0000 ;
36 0000 ; EXPRESSIONS FOR THE HIGH SPEED PRINTER I/O
37 0000 ;
38 0000 0048 A HSPAD = 9*8
39 0000 ;

40 0000 .PAGE 'REFERENCED VARIABLES'
41 0000 ;
42 0000 .BSECT
43 0000 0822 T FIRST: .WORD BUF
44 0001 0822 T LAST: .WORD BUF
45 0002 0120 T PTRBUF: .WORD RBUF
46 0003 0650 T ADPLN: .WORD PUTLN
47 0004 066A T ADPLN2: .WORD PUTLN2
48 0005 03B9 T ADSETB: .WORD SETBUF
49 0006 0120 T ADRBUF: .WORD RBUF
50 0007 0135 T ADDBUF: .WORD DBUF
51 0008 013C T ADBUF2: .WORD BUF2
52 0009 01B5 T ADBUF: .WORD BUF1
53 000A 0775 T DEVICE: .WORD PPUTC
54 000B 0134 T RBMAX: .WORD RBUF+20
55 000C 000D B SHT39: .=.+1
56 000D 000E B END: .=.+1
57 000E 000F B ADTAB: .WORD TAB1
;BUF LIMIT FOR TESTING BUFFER FULL
;END OF EDIT BUFFER

```



```

58 000F 0008 A TAB1: .WORD 8
59 0010 0010 A TAB2: .WORD 16
60 0011 0020 A TAB3: .WORD 32
61 0012 0006 A MAXSTR: .WORD 6
62 0013 0280 A MAXTS: .WORD 640
63 0014 0041 A LLIM: .WORD 65 ;MAX NUMBER OF CHARS IN ONE LINE

```

```

64 0015 .PAGE 'TEMPORARY BUFFERS'
65 0015 ;
66 0015 0016 B SLO: .+.1
67 0016 0017 B SHI: .+.1
68 0017 0018 B RLO: .+.1
69 0018 0019 B RHI: .+.1
70 0019 001D B REG: .+.4
71 001D 001E B CMND: .+.1
72 001E 001F B EXPMND: .+.1
73 001F 0020 B MODE: .+.1
74 0020 0021 B RGFLG: .+.1
75 0021 0022 B EXPTST: .+.1
76 0022 0023 B FNDDTST: .+.1
77 0023 0024 B NUMTST: .+.1
78 0024 0025 B RNDGTST: .+.1
79 0025 0026 B PTBUF: .+.1
80 0026 0027 B OPER: .+.1
81 0027 0028 B COUNT1: .+.1
82 0028 0029 B COUNT2: .+.1
83 0029 002A B LLEN: .+.1 ;CURRENT LINE LENGTH
84 002A 002B B LLEN1: .+.1 ;ORIGINAL LINE LENGTH

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85 002B .PAGE 'CONSTANTS'
86 002B ;
87 002B 0000 A ZERO: .WORD X'0
88 002C 0001 A H01: .WORD X'01
89 002D 0003 A H03: .WORD X'03
90 002E 0004 A H04: .WORD X'04
91 002F 0009 A H09: .WORD X'09
92 0030 000A A H0A: .WORD X'0A
93 0031 000D A H0D: .WORD X'0D
94 0032 000F A H0F: .WORD X'0F
95 0033 0011 A H11: .WORD X'11
96 0034 0018 A H18: .WORD X'18
97 0035 001F A H1F: .WORD X'1F
98 0036 0020 A H20: .WORD X'20
99 0037 0027 A H27: .WORD X'27
100 0038 002C A H2C: .WORD X'2C
101 0039 002F A H2F: .WORD X'2F
102 003A 0039 A H39: .WORD X'39
103 003B 0040 A H40: .WORD X'40
104 003C 0054 A H54: .WORD X'54
105 003D 005A A H5A: .WORD X'5A
106 003E 005F A H5F: .WORD X'5F
107 003F 007F A H7F: .WORD X'7F
108 0040 0080 A H80: .WORD X'80
109 0041 00C0 A HC0: .WORD X'C0
110 0042 00F0 A HF0: .WORD X'F0
111 0043 00DF A HDF: .WORD X'DF
112 0044 00FF A HFF: .WORD X'FF
113 0045 0100 A H100: .WORD X'0100
114 0046 0600 A H600: .WORD X'0600
115 0047 1F00 A H1F00: .WORD X'1F00
116 0048 8000 A H8000: .WORD X'8000
117 0049 FFFF A HFFFF: .WORD X'FFFF
118 004A 4D53 A ASCMS: .ASCII 'MS'

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119 004B 4653 A ASCFS: .ASCII 'FS'
120 004C 0760 A CPAD: .WORD 0760

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121 004D .PAGE 'SUBROUTINE VECTORS'
122 004D ;
123 004D 0720 T SINTST: .WORD INTEST
124 004E 0728 T SRESET: .WORD RESET
125 004F 06F3 T SCRLF: .WORD CRLF
126 0050 06EC T TYPERR: .WORD WAITCR+3
127 0051 0775 T SPUTC: .WORD PPUTC
128 0052 0731 T SGETC: .WORD PGETC
129 0053 075E T SGECO: .WORD PGECO
130 0054 070C T SO2CH: .WORD O2CH
131 0055 070B T SO3CH: .WORD O3CH
132 0056 06FC T SGETCO: .WORD GETCO
133 0057 0700 T STYPE: .WORD TYPE
134 0058 028F T START1: .WORD PROMPT
135 0059 06EF T TRISTR: .WORD SPATSK
136 005A 0613 T ADCGET: .WORD PCRGET
137 005B 0585 T ADKGET: .WORD KBGETC
138 005C 059F T ADTGET: .WORD PTGETC
139 005D 070E T ADHSP: .WORD HSPRT
140 005E 06E4 T RINIT1: .WORD REINIT+1
141 005F 0762 T LPUTC: .WORD PUTC
142 0060 072C T LGETC: .WORD GETC
143 0061 0735 T LGECO: .WORD GECO
144 0062 05F0 T LCRGET: .WORD CRGETC

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```

145 0063 .PAGE 'START OF PROGRAM'
146 0063 ;
147 0063 .TSECT
148 0000 0120 T .=.+0120
149 0120 0135 T RBUF: .=.+21
150 0135 013C T DBUF: .=.+7
151 013C 01B5 T BUF2: .=.+121
152 01B5 0235 T BUF1: .=.+128
153 0235 ;
154 0235 0250 T .=.+27 ; FREE SPACE
155 0250 ;
156 0250 8C4C B START: LD 3,CPAD
157 0251 0418 A RIN GPCS
158 0252 4801 A AISZ 0,1
159 0253 2930 A JSR LINIT
160 0254 2C57 B JSR @STYPE
161 0255 07B9 T .WORD TPAK1
162 0256 2921 A JSR GETMEM
163 0257 21F8 A JMP START
164 0258 2114 A JMP $3
165 0259 2C53 B JSR @SGECO
166 025A 48C6 A AISZ 0,-X'3A
167 025B 21F4 A JMP START
168 025C 2C63 I JSR GETDEC
169 025D 21F2 A JMP START
170 025E 3481 A RCPY 1,0
171 025F 6032 B AND 0,H0F
172 0260 6442 B AND 1,HF0
173 0261 5DFF A SHR 1,1
174 0262 3400 A RADD 1,0
175 0263 5DFE A SHR 1,2
176 0264 3400 A RADD 1,0
177 0265 4D00 A LI 1,0
178 0266 D02E B $5: SUB 0,H04
179 0267 1103 A BOC ZRO,$6

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180 0268 1B02 A      BOC      NEG,$6
181 0269 4901 A      AISZ     1,1
182 026A 21FB A      JMP      $5
183 026B 5D0C A $6:   SHL      1,12
184 026C 2101 A      JMP      .+2
185 026D             ;
186 026D 4D00 A $3:   LI        1,0
187 026E 4CFF A      LI        0,-1
188 026F 5CFC A      SHR      0,4
189 0270 3100 A      RADD     0,1
190 0271 49FF A      AISZ     1,-1
191 0272 A40D B      ST        1,END
192 0273 49D8 A      AISZ     1,-40
193 0274 A40C B      ST        1,SHT39
194 0275 2C4F B $4:   JSR      @SCRLF
195 0276 2C4F B $4A: JSR      @SCRLF
196 0277 2117 A      JMP      PROMPT
197 0278             ;
198 0278 2C53 B GETMEM: JSR      @SGECO
199 0279 F033 B      SKNE     0,H11
200 027A 0200 A      RTS
201 027B F031 B      SKNE     0,H0D
202 027C 0201 A      RTS      1
203 027D E03A B      SKG      0,H39
204 027E E039 B      SKG      0,H2F
205 027F 0200 A      RTS
206 0280 6032 B      AND      0,H0F
207 0281 4800 A      AISZ     0,0      ; 0 IS ONLY LEGAL VALUE FOR 1ST FIELD
208 0282 0200 A      RTS
209 0283 0202 A      RTS      2

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210 0284             .PAGE      'I/O INITIALIZATION FOR 16L'
211 0284             ;
212 0284 805F B LINIT: LD        0,LPUTC
213 0285 A051 B      ST        0,SPUTC
214 0286 8060 B      LD        0,LGETC
215 0287 A052 B      ST        0,SGETC
216 0288 8061 B      LD        0,LGECO
217 0289 A053 B      ST        0,SGECO
218 028A 8062 B      LD        0,LCRGET
219 028B A05A B      ST        0,ADCGET
220 028C 805F B      LD        0,LPUTC
221 028D A00A B      ST        0,DEVICE
222 028E 0200 A      RTS

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223 028F             .PAGE      'PROMPT FOR COMMAND'
224 028F             ;
225 028F 8051 B PROMPT: LD        0,SPUTC
226 0290 A00A B      ST        0,DEVICE
227 0291 2C4F B      JSR      @SCRLF
228 0292 4C20 A      LI        0,X'20      ;SPACE
229 0293 2C55 B      JSR      @SO3CH
230 0294 4C3F A      LI        0,X'3F      ;QUESTION MARK
231 0295 2C51 B      JSR      @SPUTC
232 0296 4C20 A      LI        0,X'20      ;SPACE
233 0297 2C54 B      JSR      @SO2CH
234 0298 2C53 B      JSR      @SGECO
235 0299 F033 B      SKNE     0,H11      ;DC1
236 029A 212E A      JMP      $13

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```

237 029B F031 B      SKNE    0,H0D      ;CARRIAGE RETURN
238 029C 21D9 A      JMP      $4A
239 029D F036 B      SKNE    0,H20      ;SPACE
240 029E 21FD A      JMP      .-2
241 029F E03D B      SKG     0,H5A      ;TEST FOR ALPHA CHARACTER
242 02A0 E03B B      SKG     0,H40
243 02A1 2464 I      JMP      WAITCR    ;ERROR
244 02A2 3181 A      RCPY    0,1
245 02A3 5D08 A      SHL     1,8
246 02A4 2C56 B      JSR     @SGETCO
247 02A5 E03D B      SKG     0,H5A      ;TEST FOR ALPHA INPUT
248 02A6 E03B B      SKG     0,H40
249 02A7 2465 I      JMP      WAIT1     ;SKIP TO NEXT CARRAGE RETURN
250 02A8 3100 A      RADD    0,1
251 02A9 A41D B      ST      1,CMND
252 02AA 2916 A      JSR     TSTINT
253 02AB 2946 A      JSR     RNGE
254 02AC 210C A      JMP      JMPTBL
255 02AD 2C56 B      JSR     @SGETCO
256 02AE F031 B      SKNE    0,H0D      ;CARRIAGE RETURN
257 02AF 2450 B      JMP      @TYPERR
258 02B0 48B1 A      AISZ    0,-X'4F
259 02B1 2464 I      JMP      WAITCR
260 02B2 2C63 I      JSR     GETDEC
261 02B3 2465 I      JMP      WAIT1     ;SKIP TO NEXT CARRIAGE RETURN
262 02B4 A41E B      ST      1,EXPMND
263 02B5 4D01 A      LI      1,1
264 02B6 A421 B      ST      1,EXPTST
265 02B7 48F3 A      AISZ    0,-X'0D
266 02B8 2464 I      JMP      WAITCR
267 02B9 8914 A      JMPTBL: LD      2,CMDTBL
268 02BA 801D B      LD      0,CMND
269 02BB F200 A      JMPT1: SKNE    0,(2)
270 02BC 2601 A      JMP      @1(2)
271 02BD F933 A      SKNE    2,ENDTBL
272 02BE 2450 B      JMP      @TYPERR
273 02BF 4A02 A      AISZ    2,2
274 02C0 21FA A      JMP      JMPT1
275 02C1 8006 B      TSTINT: LD      0,ADRBUF
276 02C2 A002 B      ST      0,PTRBUF
277 02C3 4C00 A      LI      0,0
278 02C4 A021 B      ST      0,EXPTST
279 02C5 A022 B      ST      0,FNDTST
280 02C6 A023 B      ST      0,NUMTST
281 02C7 A024 B      ST      0,RNGTST
282 02C8 0200 A      RTS
283 02C9 ;
284 02C9 29F7 A      $13: JSR     TSTINT
285 02CA 8C06 B      LD      3,ADRBUF
286 02CB 294A A      JSR     TERRNG
287 02CC 2C4F B      JSR     @SCRLF
288 02CD 250C A      JMP      @KBMODE

289 02CE .PAGE      'COMMAND TABLE'
290 02CE ;
291 02CE 02CF T      CMDTBL: .WORD    .+1
292 02CF 4342 A      .ASCII   'CB'
293 02D0 035C T      .WORD    CLRBUF
294 02D1 434C A      .ASCII   'CL'
295 02D2 0490 T      .WORD    COPYLN
296 02D3 444C A      .ASCII   'DL'
297 02D4 0360 T      .WORD    DELELN

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298 02D5 4653 A      .ASCII 'FS'
299 02D6 038D T      .WORD  FNDSTR
300 02D7 4850 A      .ASCII 'HP'
301 02D8 0620 T      .WORD  PRINTL
302 02D9 4B42 A      .ASCII 'KB'
303 02DA 053E T      KBMODE: .WORD  KBREAD
304 02DB 4C46 A      .ASCII 'LF'
305 02DC 0638 T      .WORD  LISTF
306 02DD 4C4C A      .ASCII 'LL'
307 02DE 063E T      .WORD  LISTL
308 02DF 4C53 A      .ASCII 'LS'
309 02E0 061F T      .WORD  TYPEL
310 02E1 4D44 A      .ASCII 'MD'
311 02E2 03A9 T      .WORD  MODLN
312 02E3 4D53 A      .ASCII 'MS'
313 02E4 038F T      .WORD  MODSTR
314 02E5 4D56 A      .ASCII 'MV'
315 02E6 04A4 T      .WORD  MOVELN
316 02E7 5054 A      .ASCII 'PT'
317 02E8 061D T      .WORD  PUNCHL
318 02E9 5243 A      .ASCII 'RC'
319 02EA 0540 T      .WORD  CRREAD
320 02EB 5254 A      .ASCII 'RT'
321 02EC 0542 T      .WORD  PTREAD
322 02ED 5354 A      .ASCII 'ST'
323 02EE 04D9 T      .WORD  SETTAB
324 02EF 544C A      .ASCII 'TL'
325 02F0 0519 T      .WORD  LEADTR
326 02F1 02EF T      ENDTBL: .WORD  .-2

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```

327 02F2          .PAGE  'GET RANGE ROUTINE'
328 02F2          .LOCAL
329 02F2          ;
330 02F2 8C06 B      LD      3,ADRBUF
331 02F3 4C00 A      RNGE1:  LI      0,0
332 02F4 A020 B      ST      0,RGFLG
333 02F5 294E A      $7:    JSR      GETDEC
334 02F6 2116 A      JMP      $10
335 02F7 F42B B      SKNE    1,ZERO
336 02F8 2465 I      JMP      WAIT1          ;SKIP TO NEXT CARRIAGE RETURN
337 02F9 2922 A      JSR      STRBUF
338 02FA 7824 B      ISZ     RNGTST
339 02FB F039 B      SKNE    0,H2F          ; SLASH
340 02FC 210B A      JMP      $9
341 02FD F031 B      SKNE    0,H0D          ; CARRIAGE-RETURN
342 02FE 2117 A      JMP      TERRNG
343 02FF F038 B      SKNE    0,H2C          ; COMMA
344 0300 2103 A      JMP      $8
345 0301 F03C B      SKNE    0,H54          ; ASCII T
346 0302 2117 A      JMP      $12
347 0303 2464 I      JMP      WAITCR
348 0304          ;
349 0304 4DFF A      $8:    LI      1,-1
350 0305 2916 A      JSR      STRBUF
351 0306 7823 B      ISZ     NUMTST
352 0307 21EB A      JMP      RNGE1
353 0308          ;
354 0308 8020 B      $9:    LD      0,RGFLG
355 0309 150B A      BOC     NZRO,$10A
356 030A 7820 B      ISZ     RGFLG
357 030B 7823 B      ISZ     NUMTST
358 030C 21E8 A      JMP      $7
359 030D          ;
360 030D 8423 B      $10:   LD      1,NUMTST
361 030E 4900 A      AISZ    1,0
362 030F 2465 I      JMP      WAIT1

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363 0310 F037 B      SKNE      0,H27      ; PRIME
364 0311 210F A      JMP      GETSTR
365 0312 F03C B      SKNE      0,H54
366 0313 2106 A      JMP      $12
367 0314 48F3 A      AISZ      0,-X'0D
368 0315 2464 I $10A: JMP      WAITCR
369 0316 4DFF A TERRNG: LI      1,-1
370 0317 2904 A      JSR      STRBUF
371 0318 4D0D A      LI      1,X'0D
372 0319 2104 A      JMP      STRB2
373 031A      ;
374 031A 29FB A $12:   JSR      TERRNG
375 031B 0201 A      RTS      1
376 031C      ;
377 031C FC0B B STRBUF: SKNE      3,RBMAX
378 031D 2464 I      JMP      WAITCR
379 031E A700 A STRB2: ST      1,(3)
380 031F 4B01 A      AISZ      3,1
381 0320 0200 A      RTS

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382 0321      .PAGE      'GET STRING ROUTINE'
383 0321      ;
384 0321 8024 B GETSTR: LD      0,RNGTST
385 0322 1505 A      BOC      NZRO,GETS1
386 0323 841D B      LD      1,CMND
387 0324 F44B B      SKNE      1,ASCFS
388 0325 2103 A      JMP      GETS2
389 0326 F44A B      SKNE      1,ASCMS
390 0327 2101 A      JMP      GETS2
391 0328 2464 I GETS1: JMP      WAITCR
392 0329 8806 B GETS2: LD      2,ADRBUF
393 032A 4A01 A      AISZ      2,1
394 032B 8412 B      LD      1,MAXSTR
395 032C 2C56 B $4:   JSR      @SGETCO
396 032D A200 A $4A: ST      0,(2)
397 032E 4A01 A      AISZ      2,1
398 032F F037 B      SKNE      0,H27
399 0330 2105 A      JMP      $5
400 0331 F031 B      SKNE      0,H0D
401 0332 2450 B      JMP      @TYPERR
402 0333 49FF A      AISZ      1,-1
403 0334 21F7 A      JMP      $4
404 0335 2464 I      JMP      WAITCR
405 0336      ;
406 0336 2C56 B $5:   JSR      @SGETCO
407 0337 F031 B      SKNE      0,H0D
408 0338 2103 A      JMP      $6
409 0339 49FF A      AISZ      1,-1
410 033A 21F2 A      JMP      $4A
411 033B 2464 I      JMP      WAITCR
412 033C      ;
413 033C D412 B $6:   SUB      1,MAXSTR
414 033D 5101 A      CAI      1,1
415 033E B406 B      ST      1,@ADRBUF
416 033F 4CFF A      LI      0,-1
417 0340 A024 B      ST      0,RNGTST
418 0341 4900 A      AISZ      1,0
419 0342 2466 I      JMP      JMPTBL
420 0343 2450 B      JMP      @TYPERR

```

```

421 0344          .PAGE  'GET DECIMAL ROUTINE'
422 0344          ;
423 0344 4D00 A GETDEC: LI      1,0
424 0345 4E00 A      LI      2,0
425 0346 2C56 B $1:  JSR      @SGETCO
426 0347 F036 B      SKNE     0,H20
427 0348 210A A      JMP      $2
428 0349 E03A B      SKG      0,H39
429 034A E039 B      SKG      0,H2F
430 034B 210D A      JMP      $3
431 034C 6032 B      AND      0,H0F
432 034D 5D04 A      SHL      1,4
433 034E 3100 A      RADD     0,1
434 034F 4A01 A      AISZ     2,1
435 0350 E82E B      SKG      2,H04
436 0351 21F4 A      JMP      $1
437 0352 2464 I      JMP      WAITCR
438 0353          ;
439 0353 3881 A $2:  RCPY      2,0
440 0354 11F1 A      BOC      ZRO,$1
441 0355 2C56 B      JSR      @SGETCO
442 0356 F036 B      SKNE     0,H20
443 0357 21FD A      JMP      .-2
444 0358 0201 A      RTS      1
445 0359          ;
446 0359 4A00 A $3:  AISZ      2,0
447 035A 0201 A      RTS      1
448 035B 0200 A      RTS

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449 035C          .PAGE  'CLEAR BUFFER ROUTINE'
450 035C          ;
451 035C 2C67 I CLRBUF: JSR      RNGZRO
452 035D 8C00 B      LD       3,FIRST
453 035E AC01 B      ST       3,LAST
454 035F 2458 B      JMP      @START1

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```

455 0360          .PAGE  'DELETE LINE ROUTINE'
456 0360          .LOCAL
457 0360          ;
458 0360 2C68 I DELELN: JSR      EXPZRO
459 0361 2C69 I DEL1:  JSR      STLOHI
460 0362 2110 A      JMP      NUMBER
461 0363 8017 B      LD       0,RLO
462 0364 1501 A      BOC      NZRO,+.2
463 0365 2C50 B      JSR      @TYPERR
464 0366 2C6A I      JSR      SRCHRG
465 0367 21F9 A      JMP      DEL1
466 0368 8C18 B      LD       3,RHI
467 0369 FC01 B $1:  SKNE     3,LAST
468 036A 2105 A      JMP      $2
469 036B 8300 A      LD       0,(3)
470 036C B017 B      ST       0,@RLO
471 036D 7817 B      ISZ      RLO
472 036E 4B01 A      AISZ     3,1
473 036F 21F9 A      JMP      $1
474 0370          ;
475 0370 8C17 B $2:  LD       3,RLO
476 0371 AC01 B      ST       3,LAST
477 0372 21EE A      JMP      DEL1
478 0373          ;
479 0373 8022 B NUMBER: LD      0,FNDTST
480 0374 1503 A      BOC      NZRO,NUM1

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481 0375 2C57 B NUM3: JSR @STYPE
482 0376 07FE T .WORD VOID
483 0377 245E B JMP @RINIT1
484 0378 8C00 B NUM1: LD 3,FIRST
485 0379 4D00 A LI 1,0
486 037A FC01 B NUM2: SKNE 3,LAST
487 037B 245E B JMP @RINIT1
488 037C 2903 A JSR INCONE
489 037D A700 A ST 1,(3)
490 037E 2C6B I JSR ANDH0D
491 037F 21FA A JMP NUM2
492 0380 ;
493 0380 4901 A INCONE: AISZ 1,1
494 0381 3481 A RCPY 1,0
495 0382 2C6C I JSR ANDH0A
496 0383 4906 A AISZ 1,6
497 0384 3481 A RCPY 1,0
498 0385 5CFC A SHR 0,4
499 0386 2C6C I JSR ANDH0A
500 0387 4960 A AISZ 1,X'60
501 0388 3481 A RCPY 1,0
502 0389 5CF8 A SHR 0,8
503 038A 2C6C I JSR ANDH0A
504 038B C446 B ADD 1,H600
505 038C 0200 A RTS

506 038D .PAGE 'FIND/MODIFY STRING ROUTINE'
507 038D .LOCAL
508 038D ;
509 038D 4C00 A FNDSTR: LI 0,0
510 038E 2101 A JMP .+2
511 038F 4C01 A MODSTR: LI 0,1
512 0390 A01D B ST 0,CMND
513 0391 8024 B LD 0,RNGTST
514 0392 4801 A AISZ 0,1
515 0393 2450 B JMP @TYPERR
516 0394 2C68 I JSR EXPZRO
517 0395 8C01 B LD 3,LAST
518 0396 AC24 B ST 3,RNGTST
519 0397 8C00 B LD 3,FIRST
520 0398 FC01 B SKNE 3,LAST
521 0399 246D I JMP NOFILE
522 039A AC1E B ST 3,EXPMND
523 039B 2917 A $3: JSR SETLN
524 039C 2929 A JSR SRCHST
525 039D 2106 A JMP $3B
526 039E 7822 B ISZ FNDTST
527 039F 801D B LD 0,CMND
528 03A0 1102 A BOC ZRO,$3A
529 03A1 2946 A JSR MODIFY
530 03A2 2103 A JMP $3C
531 03A3 2919 A $3A: JSR OUTBUF
532 03A4 8C23 B $3B: LD 3,NUMTST
533 03A5 AC1E B ST 3,EXPMND
534 03A6 FC24 B $3C: SKNE 3,RNGTST
535 03A7 21CB A JMP NUMBER
536 03A8 21F2 A JMP $3

537 03A9 .PAGE 'MODIFY LINE ROUTINE'
538 03A9 ;
539 03A9 2C6E I MODLN: JSR SETLHR
540 03AA AC1E B ST 3,EXPMND
541 03AB 8C18 B LD 3,RHI

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542 03AC AC24 B      ST      3,RNGTST
543 03AD 2905 A MOD1: JSR      SETLN
544 03AE 2939 A      JSR      MODIFY
545 03AF 8C1E B      LD       3,EXPMND
546 03B0 FC24 B      SKNE     3,RNGTST
547 03B1 21F7 A      JMP      MODLN
548 03B2 21FA A      JMP      MOD1

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549 03B3                .PAGE   'SET/OUTPUT LINE IN BUFFER'
550 03B3                ;
551 03B3 8C1E B SETLN: LD       3,EXPMND
552 03B4 8007 B      LD       0,ADDBUF
553 03B5 A025 B      ST       0,PTBUF
554 03B6 8005 B      LD       0,ADSETB
555 03B7 A00A B      ST       0,DEVICE
556 03B8 2403 B      JMP      @ADPLN
557 03B9                ;
558 03B9 B025 B SETBUF: ST      0,@PTBUF
559 03BA 7825 B      ISZ      PTBUF
560 03BB AC23 B      ST       3,NUMTST
561 03BC 0200 A      RTS
562 03BD                ;
563 03BD 8C07 B OUTBUF: LD      3,ADDBUF
564 03BE 8300 A OUT1:  LD      0,(3)
565 03BF 2C51 B      JSR      @SPUTC
566 03C0 4B01 A      AISZ     3,1
567 03C1 48F3 A      AISZ     0,-X'0D
568 03C2 21FB A      JMP      OUT1
569 03C3 4C0A A      LI       0,0A      ;TRANSMIT LINE-FEED
570 03C4 2C51 B      JSR      @SPUTC
571 03C5 0200 A      RTS

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572 03C6                .PAGE   'SEARCH STRING ROUTINE'
573 03C6                ;
574 03C6 8C08 B SRCHST: LD      3,ADBUF2
575 03C7 4D0D A      LI       1,X'0D
576 03C8 8806 B SRCH1: LD      2,ADRBUF
577 03C9 8200 A      LD      0,(2)
578 03CA A025 B      ST       0,PTBUF
579 03CB 4A01 A      AISZ     2,1
580 03CC 8200 A      LD      0,(2)
581 03CD F300 A $1:   SKNE     0,(3)
582 03CE 2104 A      JMP      $2
583 03CF F700 A      SKNE     1,(3)
584 03D0 2110 A      JMP      $4
585 03D1 4B01 A      AISZ     3,1
586 03D2 21FA A      JMP      $1
587 03D3                ;
588 03D3 2C6F I $2:   JSR      SAVE
589 03D4 7C25 B $2A:  DSZ      PTBUF
590 03D5 2101 A      JMP      .+2
591 03D6 0201 A      RTS      1
592 03D7 4A01 A      AISZ     2,1
593 03D8 4B01 A      AISZ     3,1
594 03D9 8200 A      LD      0,(2)
595 03DA F300 A      SKNE     0,(3)
596 03DB 21F8 A      JMP      $2A
597 03DC F700 A      SKNE     1,(3)
598 03DD 2103 A      JMP      $4
599 03DE 2C70 I      JSR      RESTOR
600 03DF 4B01 A      AISZ     3,1
601 03E0 21E7 A      JMP      SRCH1
602 03E1                ;

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603 03E1 8200 A $4: LD 0,(2)
604 03E2 48E0 A AISZ 0,-X'20
605 03E3 0200 A RTS
606 03E4 4A01 A AISZ 2,1
607 03E5 7C25 B DSZ PTBUF
608 03E6 21FA A JMP $4
609 03E7 0201 A RTS 1

610 03E8 .PAGE 'MODIFICATION ROUTINE'
611 03E8 ;
612 03E8 8C01 B MODIFY: LD 3, LAST ;CHECK FOR BUFFER OVERFLOW
613 03E9 EC0C B SKG 3, SHT39
614 03EA 2102 A JMP MODI
615 03EB 2C71 I JSR BUFULL
616 03EC 245E B JMP @RINIT1
617 03ED 8C5B B MODI: LD 3, ADKGET
618 03EE AC1F B ST 3, MODE
619 03EF 8C01 B LD 3, LAST
620 03F0 AC16 B ST 3, SHI
621 03F1 2919 A JSR MOD
622 03F2 8C1E B LD 3, EXPMND
623 03F3 4B01 A AISZ 3, 1
624 03F4 AC17 B ST 3, RLO
625 03F5 8C23 B LD 3, NUMTST
626 03F6 AC18 B ST 3, RHI
627 03F7 8C24 B LD 3, RGTST
628 03F8 AC15 B ST 3, SLO
629 03F9 2C72 I JSR USHIFT
630 03FA 8C01 B LD 3, LAST
631 03FB AC16 B ST 3, SHI
632 03FC 8C08 B LD 3, ADBUF2
633 03FD 2C73 I JSR STBUF
634 03FE 8801 B LD 2, LAST
635 03FF 8C16 B LD 3, SHI
636 0400 AC01 B ST 3, LAST
637 0401 8C15 B LD 3, SLO
638 0402 A815 B ST 2, SLO
639 0403 AC16 B ST 3, SHI
640 0404 2C74 I JSR DSHIFT
641 0405 8C16 B LD 3, SHI
642 0406 AC24 B ST 3, RGTST
643 0407 8C18 B LD 3, RHI
644 0408 AC1E B ST 3, EXPMND
645 0409 0200 A RTS
646 040A ;
647 040A 2C59 B MODI2: JSR @TRISTR
648 040B ;
649 040B 29B1 A MOD: JSR OUTBUF
650 040C 8051 B LD 0, SPUTC
651 040D A00A B ST 0, DEVICE
652 040E 2C57 B JSR @STYPE
653 040F 0812 T .WORD ALTERS
654 0410 2940 A JSR GLEN
655 0411 8C29 B LD 3, LLEN ;SAVE CURRENT LINE LENGTH
656 0412 AC2A B ST 3, LLEN1
657 0413 8C08 B LD 3, ADBUF2
658 0414 AC25 B ST 3, PTBUF
659 0415 8C09 B LD 3, ADBUF
660 0416 4E41 A LI 2, 65 ;ALLOW 65 CHARS PER LINE
661 0417 2C53 B JSR @SGECO
662 0418 2C75 I JSR TTYINP
663 0419 2476 I JMP REINIT

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664 041A 2115 A      JMP      TESTCZ
665 041B 0200 A      RTS
666 041C 2C53 B $6:   JSR      @SGECO
667 041D 2C75 I      JSR      TTYINP
668 041E 21EB A      JMP      MODI2
669 041F 2110 A      JMP      TESTCZ
670 0420 213D A      JMP      $10
671 0421 4C0D A $6A:  LI       0,X'0D      ;SPREAD BUFFER TO INSERT LONGER LINE
672 0422 A300 A      ST        0,(3)
673 0423 4B01 A      AISZ     3,1
674 0424 4C0A A      LI       0,X'0A
675 0425 A300 A      ST        0,(3)
676 0426 2C4F B      JSR      @SCRFLF
677 0427 8808 B      LD        2,ADBUF2
678 0428 8C09 B      LD        3,ADBUF
679 0429 8300 A $6B:  LD        0,(3)
680 042A A200 A      ST        0,(2)
681 042B 4B01 A      AISZ     3,1
682 042C 4A01 A      AISZ     2,1
683 042D 48F6 A      AISZ     0,-X'0A
684 042E 21FA A      JMP      $6B
685 042F 21DB A      JMP      MOD
686 0430          ;
687 0430 C849 B TESTCZ: ADD      2,HFFFF
688 0431 F034 B      SKNE     0,H18      ; CTRL/X
689 0432 2137 A      JMP      $11
690 0433 F02C B      SKNE     0,H01      ; CTRL/A
691 0434 2142 A      JMP      $12
692 0435 F02E B      SKNE     0,H04      ; CTRL/D
693 0436 2157 A      JMP      $13
694 0437 C82C B      ADD      2,H01
695 0438 48E6 A      AISZ     0,-X'1A      ; CTRL/Z
696 0439 21E2 A      JMP      $6
697 043A 2C52 B      JSR      @SGETC
698 043B E03E B      SKG      0,H5F
699 043C E035 B      SKG      0,H1F
700 043D 210E A      JMP      $71      ;ERROR
701 043E 3181 A      RCPY     0,1
702 043F 9025 B $7:   LD        0,@PTBUF      ;COPY TO LINE BUFFER
703 0440 A300 A      ST        0,(3)      ;UP TO CHARACTER SPECIFIED
704 0441 F700 A      SKNE     1,(3)
705 0442 21D9 A      JMP      $6
706 0443 2C51 B      JSR      @SPUTC      ;ECHO CHARACTER COPIED
707 0444 7825 B      ISZ      PTBUF
708 0445 4B01 A      AISZ     3,1
709 0446 F030 B      SKNE     0,H0A
710 0447 21C3 A      JMP      MOD
711 0448 4AFF A      AISZ     2,-1
712 0449 21F5 A      JMP      $7
713 044A 2C4F B      JSR      @SCRFLF
714 044B 21BF A      JMP      MOD
715 044C          ;
716 044C 4C0D A $71:  LI       0,0D      ;TRANSMIT LF-CR
717 044D 2C51 B      JSR      @SPUTC
718 044E 4C0A A      LI       0,0A
719 044F 2C51 B      JSR      @SPUTC
720 0450 21BA A      JMP      MOD
721 0451          ;
722 0451 8C08 B GLEN: LD        3,ADBUF2      ;COUNT NUMBER OF CHARACTERS IN LINE
723 0452 AC25 B      ST        3,PTBUF
724 0453 4C00 A      LI       0,0
725 0454 A029 B      ST        0,LLEN
726 0455 8809 B      LD        2,ADBUF
727 0456 9025 B $7A: LD        0,@PTBUF
728 0457 A200 A      ST        0,(2)

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729 0458 4A01 A      AISZ      2,1
730 0459 F031 B      SKNE      0,H0D
731 045A 0200 A      RTS
732 045B 7825 B      ISZ       PTBUF
733 045C 7829 B      ISZ       LLEN
734 045D 21F8 A      JMP       $7A
735 045E          ;
736 045E 8425 B $10:  LD       1,PTBUF      ;TEST LINE LENGTH
737 045F D408 B      SUB       1,ADBUF2
738 0460 E42A B      SKG       1,LLEN1
739 0461 2101 A      JMP       $10A
740 0462 21BE A      JMP       $6A
741 0463 9025 B $10A: LD       0,@PTBUF      ;FOR SHORT LINE, CLOSE UP BUFFER
742 0464 F030 B      SKNE      0,H0A
743 0465 21BB A      JMP       $6A
744 0466 A300 A      ST        0,(3)
745 0467 7825 B      ISZ       PTBUF
746 0468 4B01 A      AISZ      3,1
747 0469 21F9 A      JMP       $10A
748 046A          ;
749 046A 4C5E A $11:  LI        0,X'5E      ;DELETE CHARACTER
750 046B 2C51 B      JSR       @SPUTC
751 046C 3D81 A      RCPY      3,1
752 046D 8301 A $11A: LD       0,1(3)
753 046E A300 A      ST        0,(3)
754 046F 7C29 B      DSZ       LLEN      ;DECREMENT LINE LENGTH
755 0470 F031 B      SKNE      0,H0D      ;TERMINATE ON CARRIAGE RETURN
756 0471 2102 A      JMP       .+3
757 0472 4B01 A      AISZ      3,1
758 0473 21F9 A      JMP       $11A
759 0474 7825 B      ISZ       PTBUF
760 0475 3781 A      RCPY      1,3
761 0476 21A5 A      JMP       $6
762 0477          ;
763 0477 4C3C A $12:  LI        0,X'3C      ;INSERT CHARACTER
764 0478 2C51 B      JSR       @SPUTC      ;SEND 'X'
765 0479 2C52 B $12C: JSR       @SGETC
766 047A C849 B      ADD       2,HFFFF
767 047B F031 B      SKNE      0,H0D      ;TERMINATE ON CARRIAGE RETURN
768 047C 2109 A      JMP       $12A
769 047D 2C51 B      JSR       @SPUTC      ;ECHO CHARACTER INSERTED
770 047E 8429 B      LD        1,LLEN      ;TEST FOR LINE FULL
771 047F E414 B      SKG       1,LLIM
772 0480 2101 A      JMP       .+2
773 0481 2108 A      JMP       $12B
774 0482 A300 A      ST        0,(3)
775 0483 7829 B      ISZ       LLEN      ;INCREMENT LINE LENGTH
776 0484 4B01 A      AISZ      3,1
777 0485 21F3 A      JMP       $12C
778 0486 4C3E A $12A: LI        0,X'3E      ;SEND '>'
779 0487 2C51 B      JSR       @SPUTC
780 0488 2C4F B      JSR       @SCRLF
781 0489 21D4 A      JMP       $10
782 048A          ;
783 048A 2C4F B $12B: JSR       @SCRLF
784 048B 2C57 B      JSR       @STYPE      ;LINE IS MAXIMUM LENGTH
785 048C 0817 T      .WORD
786 048D 2477 I      JMP       MOD
787 048E          ;
788 048E 2C4F B $13:  JSR       @SCRLF
789 048F 2191 A      JMP       $6A

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790 0490                .PAGE    'COPY LINE ROUTINE'
791 0490                ;
792 0490 8001 B COPYLN: LD      0, LAST
793 0491 EC0C B          SKG     3, SHT39
794 0492 2102 A          JMP     COP1
795 0493 2C71 I          JSR     BUFULL
796 0494 245E B          JMP     @RINIT1
797 0495 A016 B COP1:   ST      0, SHI
798 0496 291E A COP2:   JSR     SETSR
799 0497 8C17 B          LD      3, RLO
800 0498 880D B          LD      2, END
801 0499 F816 B $8:     SKNE    2, SHI
802 049A 2107 A          JMP     $9
803 049B 8300 A          LD      0, (3)
804 049C B016 B          ST      0, @SHI
805 049D 7816 B          ISZ     SHI
806 049E 4B01 A          AISZ    3, 1
807 049F FC18 B          SKNE    3, RHI
808 04A0 21F5 A          JMP     COP2
809 04A1 21F7 A          JMP     $8
810 04A2                ;
811 04A2 2C71 I $9:     JSR     BUFULL
812 04A3 2458 B          JMP     @START1

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813 04A4                .PAGE    'MOVE LINE ROUTINE'
814 04A4                ;
815 04A4 8001 B MOVELN: LD      0, LAST
816 04A5 A016 B          ST      0, SHI
817 04A6 290E A MOV1:   JSR     SETSR
818 04A7 2915 A          JSR     USHIFT
819 04A8 21FD A          JMP     MOV1
820 04A9                ;
821 04A9 8001 B MLINE:  LD      0, LAST
822 04AA A015 B          ST      0, SLO
823 04AB 8016 B          LD      0, SHI
824 04AC A001 B          ST      0, LAST
825 04AD 8021 B          LD      0, EXPTST
826 04AE 1103 A          BOC     ZRO, MLIN1
827 04AF 801E B          LD      0, EXPMND
828 04B0 A017 B          ST      0, RLO
829 04B1 2C78 I          JSR     SRCHLN
830 04B2 2479 I MLIN1:  JMP     NUMBER
831 04B3 2919 A          JSR     DSHIFT
832 04B4 2479 I          JMP     NUMBER

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833 04B5                .PAGE    'SET/SEARCH ROUTINE'
834 04B5                ;
835 04B5 2C69 I SETSR:  JSR     STLOHI
836 04B6 21F2 A          JMP     MLINE
837 04B7 8017 B          LD      0, RLO
838 04B8 1501 A          BOC     NZRO, .+2
839 04B9 2450 B          JMP     @TYPERR
840 04BA 2C6A I          JSR     SRCHRG
841 04BB 21F9 A          JMP     SETSR
842 04BC 0200 A          RTS

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843 04BD                .PAGE    'SHIFT UP/DOWN ROUTINE'
844 04BD                ;
845 04BD 8C17 B USHIFT:  LD      3, RLO
846 04BE FC18 B          SKNE    3, RHI

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847 04BF 0200 A      RTS
848 04C0 8300 A      LD      0,(3)
849 04C1 B016 B      ST      0,@SHI
850 04C2 7C15 B      DSZ     SLO
851 04C3 7C18 B      DSZ     RHI
852 04C4 7C01 B      DSZ     LAST
853 04C5 8301 A USH1: LD      0,1(3)
854 04C6 A300 A      ST      0,(3)
855 04C7 4B01 A      AISZ    3,1
856 04C8 FC16 B      SKNE    3,SHI
857 04C9 21F3 A      JMP     USHIFT
858 04CA 21FA A      JMP     USH1
859 04CB          ;
860 04CB 9001 B USH2: LD      0,@LAST
861 04CC A300 A      ST      0,(3)
862 04CD 8C01 B DSHIFT: LD     3,LAST
863 04CE FC15 B      SKNE    3,SLO
864 04CF 0200 A      RTS
865 04D0 7815 B      ISZ     SLO
866 04D1 7816 B      ISZ     SHI
867 04D2 7818 B      ISZ     RHI
868 04D3 83FF A DSH1: LD     0,-1(3)
869 04D4 A300 A      ST      0,(3)
870 04D5 4BFF A      AISZ    3,-1
871 04D6 FC17 B      SKNE    3,RLO
872 04D7 21F3 A      JMP     USH2
873 04D8 21FA A      JMP     DSH1

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874 04D9          .PAGE    'SET TAB ROUTINE'
875 04D9          .LOCAL
876 04D9          ;
877 04D9 2C67 I SETTAB: JSR     RNGZRO
878 04DA 2C4F B SETT1: JSR     @SCRLF
879 04DB 4D07 A      LI      1,7
880 04DC 4C20 A      LI      0,X'20
881 04DD 2C51 B      JSR     @SPUTC
882 04DE 49FF A      AISZ    1,-1
883 04DF 21FD A      JMP     .-2
884 04E0 4E3B A      LI      2,59
885 04E1 4C31 A      LI      0,X'31
886 04E2 2C51 B $1:  JSR     @SPUTC
887 04E3 F03A B      SKNE    0,H39
888 04E4 211B A      JMP     $4
889 04E5 4801 A      AISZ    0,1
890 04E6 4AFF A $1A: AISZ    2,-1
891 04E7 21FA A      JMP     $1
892 04E8 2C4F B      JSR     @SCRLF
893 04E9 2C57 B      JSR     @STYPE
894 04EA 07EE T      .WORD   TYPE1
895 04EB 4E00 A      LI      2,0
896 04EC 4D00 A      LI      1,0
897 04ED 2C56 B      JSR     @SGETCO
898 04EE 2103 A      JMP     .+4
899 04EF 2C53 B $2:  JSR     @SGECO
900 04F0 F033 B      SKNE    0,H11
901 04F1 21E8 A      JMP     SETT1
902 04F2 F031 B      SKNE    0,H0D
903 04F3 2110 A      JMP     TSTTAB
904 04F4 F036 B      SKNE    0,H20
905 04F5 2106 A      JMP     $3
906 04F6 F82D B      SKNE    2,H03
907 04F7 21E2 A      JMP     SETT1
908 04F8 8C0E B      LD      3,ADTAB
909 04F9 3B00 A      RADD    2,3
910 04FA A700 A      ST      1,(3)
911 04FB 4A01 A      AISZ    2,1

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912 04FC 4901 A $3:    AISZ    1,1
913 04FD E43B B        SKG      1,H40
914 04FE 21F0 A        JMP      $2
915 04FF 21DA A        JMP      SETT1
916 0500                ;
917 0500 4C25 A $4:    LI        0,X'25
918 0501 2C51 B        JSR      @SPUTC
919 0502 4C31 A        LI        0,X'31
920 0503 21E2 A        JMP      $1A

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921 0504                .PAGE
922 0504 2C57 B TSTTAB: JSR      @STYPE
923 0505 07E9 T        .WORD    VERIFY
924 0506 4E00 A        LI        2,0
925 0507 4D00 A        LI        1,0
926 0508 8C0E B        LD        3,ADTAB
927 0509 4C20 A TSTT1: LI        0,X'20
928 050A F700 A TSTT2: SKNE     1,(3)
929 050B 2105 A        JMP      $5
930 050C 4901 A        AISZ     1,1
931 050D 2C51 B        JSR      @SPUTC
932 050E E43B B        SKG      1,H40
933 050F 21FA A        JMP      TSTT2
934 0510 2458 B        JMP      @START1
935 0511                ;
936 0511 4B01 A $5:    AISZ     3,1
937 0512 4C31 A        LI        0,X'31
938 0513 2C51 B        JSR      @SPUTC
939 0514 4901 A        AISZ     1,1
940 0515 4A01 A        AISZ     2,1
941 0516 F82D B        SKNE     2,H03
942 0517 2458 B        JMP      @START1
943 0518 21F0 A        JMP      TSTT1

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944 0519                .PAGE    'OUTPUT LEADER/TRAILER ROUTINE'
945 0519                ;
946 0519 2C68 I LEADTR: JSR      EXPZRO
947 051A 290B A        JSR      CNVRT
948 051B 4D14 A        LI        1,20
949 051C 5D02 A        SHL      1,2
950 051D 2C57 B        JSR      @STYPE
951 051E 07E0 T        .WORD    TPAK4
952 051F 2C52 B        JSR      @SGETC
953 0520 4C00 A        LI        0,0
954 0521 2C51 B        JSR      @SPUTC
955 0522 49FF A        AISZ     1,-1
956 0523 21FD A        JMP      .-2
957 0524 2C52 B        JSR      @SGETC
958 0525 2458 B        JMP      @START1

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959 0526                .PAGE    'BCD TO BINARY CONVERSION'
960 0526                ;
961 0526 3C81 A CNVRT:  RCPY     3,0
962 0527 D006 B        SUB      0,ADRBUF
963 0528 48FD A        AISZ     0,-3
964 0529 2112 A        JMP      $13
965 052A 87FD A        LD        1,-3(3)
966 052B E445 B        SKG      1,H100
967 052C 2101 A        JMP      .+2
968 052D 2450 B $11:   JMP      @TYPERR

```


IMPASP

REVISION-G 05/16/74
IMPASP 0000301C 6/25/74

```

1 0000          .TITLE  IMPASP, ' 0000301C  6/25/74'
2 0000          ;
3 0000          ;      SUBROUTINES NEEDED BY IMP 16 ASSEMBLER
4 0000          ;
5 0000          ;*****
6 0000 FFFF A SIZE8=-1
7 0000 0001 A SIZE4=-SIZE8
8 0000          .ASECT
9 0000 000D A      .=0D
10 000D 01F0 A      .WORD  MULT,DIVD,GETC,PUTC,RDCRD
    000E 0206 A
    000F 0246 A
    0010 022E A
    0011 029F A
11 0012 0013 A INBUF:  .=.+1
12 0013 0014 A INBUFE: .=.+1
13 0014 0243 A      .WORD  ECHOGC
14 0015 0286 A      .WORD  LINIT
15 0016 029F A      .WORD  WDSKTM
16 0017 029F A      .WORD  WDSKOB
17 0018 029F A      .WORD  RDSKIN
18 0019 029F A      .WORD  RDSKTM
19 001A 029F A PRINT:  .WORD  HSPRT
20 001B 029F A      .WORD  MESS
21 001C 029F A      .WORD  CLOSET
22 001D 029F A      .WORD  CLOSEO
23 001E 001F A DSKOBJ: .=.+1
24 001F 0020 A DSKIN:  .=.+1
25 0020 0021 A DSKTMP: .=.+1
26 0021 0022 A ABST:   .=.+1
27 0022 0023 A DSKERR: .=.+1
28 0023 01F0 A      .=01F0 ;*****
29 01F0          .ENDIF
30 01F0          ;*****
31 01F0 0000 A R0=0
32 01F0 0001 A R1=1
33 01F0 0002 A R2=2
34 01F0 0003 A R3=3
35 01F0 0001 A Z=1
36 01F0 0002 A P=2
37 01F0 0003 A ODD=3
38 01F0 0004 A BLEQ1=4
39 01F0 0005 A NZ=5

40 01F0          .PAGE  'MULT/DIV ROUTINES'
41 01F0 0002 A $PSIGN=2
42 01F0 000B A $NRGT0=11
43 01F0 0002 A $SELFF=2
44 01F0 0003 A $BIT0=3
45 01F0 0000 A AC0=0
46 01F0 0001 A AC1=1
47 01F0 0002 A AC2=2
48 01F0 0003 A AC3=3
49 01F0          ;
50 01F0          ;      MAIN CALLING PROGRAM
51 01F0          ;
52 01F0          ;
53 01F0          ;      SUBROUTINE  MULT
54 01F0          ;
55 01F0 A912 A MULT:  ST      AC2,$S2
56 01F1 AD12 A      ST      AC3,$S3
57 01F2 4E00 A      LI      AC2,0          ;CLEAR AC2

```

IMPASP

```

58 01F3 4F10 A      LI      AC3,16      ;BIT COUNT=16
59 01F4 5000 A      CAI      AC0,0      ;COMPLEMENT AC0 TO SIMPLIFY
60 01F5              ;BRANCHING ON MULTIPLIER BIT0
61 01F5 0A00 A      SFLG     $SELFF     ;INCLUDE LINK IN SHIFTS
62 01F6 5E01 A      SHL      AC2,1      ;CLEAR LINK
63 01F7 1301 A $LOOP: BOC      $BIT0,,+2 ;BRANCH IF AC0 COMPLEMENTED=0
64 01F8 3600 A      RADD     AC1,AC2     ;AC1+AC2 --> AC2
65 01F9 5AFF A      ROR      AC2,1      ;ROTATE RESULT OF ADD INTO LINK
66 01FA 5CFF A      SHR      AC0,1      ;SHIFT LINK INTO AC0
67 01FB 48FF A      AISZ     AC3,-1     ;DECR COUNT, SKIP IF ZERO
68 01FC 21FA A      JMP      $LOOP
69 01FD 3181 A      RCPY     AC0,AC1     ;MOVE LO ORDER RESULT TO AC1
70 01FE 3881 A      RCPY     AC2,AC0     ;MOVE HI ORDER RESULT TO AC0
71 01FF 8D04 A      LD       AC3,$S3
72 0200 8902 A      LD       AC2,$S2
73 0201 0A80 A      PFLG     $SELFF     ;CLEAR SELF
74 0202 0200 A      RTS
75 0203 0204 A $S2:   .=. +1
76 0204 0205 A $S3:   .=. +1
77 0205              ;
78 0205              ; SUBRCUTINE DIVD
79 0205              ;
80 0205 0000 A $COUNT: .WORD 0
81 0206 A924 A DIVD:  ST       AC2,$SAV2   ;SAVE AC2
82 0207 3281 A      RCPY     AC0,AC2
83 0208 5001 A      CAI      AC0,1
84 0209 3C00 A      RADD     AC3,AC0      ;SUBTRACT HI ORDER FROM DIVISOR
85 020A 1B1D A      BOC      $NRGT0,$OVFLW ;IS HI ORDER >= DIVISOR
86 020B 4CF0 A      LI       AC0,-16     ;NO
87 020C A1F8 A      ST       AC0,$COUNT ;SET COUNT=16
88 020D 0A00 A      SFLG     $SELFF     ;SET SELX
89 020E 4C00 A      LI       AC0,0
90 020F 5C01 A      SHL      AC0,1      ;CLEAR LINK
91 0210 5D01 A      SHL      AC1,1
92 0211 5A01 A $POOL: ROL      AC2,1      ;ROTATE HI ORDER LEFT WITH LINK
93 0212 3881 A      RCPY     AC2,AC0
94 0213 5001 A      CAI      AC0,1
95 0214 3C00 A      RADD     AC3,AC0      ;SUBTRACT HI ORDER FROM DIVISOR
96 0215 1B03 A      BOC      $NRGT0,$GOES ;IS HI ORDER >= DIVISOR
97 0216 4C00 A      LI       AC0,0      ;NO
98 0217 5C01 A      SHL      AC0,1      ;CLEAR LINK
99 0218 2104 A      JMP      $SHFTLO
100 0219 5001 A $GOES: CAI      AC0,1      ;YES
101 021A 3281 A      RCPY     AC0,AC2     ;HI ORDER = HI ORDER - DIVISOR
102 021B 4CFF A      LI       AC0,-1
103 021C 5C01 A      SHL      AC0,1      ;SET LINK
104 021D 5901 A $SHFTLO: ROL     AC1,1     ;ROTATE LO ORDER WITH LINK LEFT
105 021E 79E6 A      ISZ      $COUNT    ;ARE WE DONE?
106 021F 21F1 A      JMP      $POOL      ;NO
107 0220 3481 A      RCPY     AC1,AC0     ;YES
108 0221 1201 A      BOC      $PSIGN,,+2 ;IS RESULT NEG
109 0222 2105 A      JMP      $OVFLW     ;YES, OVERFLOW
110 0223 3881 A      RCPY     AC2,AC0     ;NO MOVE REMAINDER TO AC0, QUOT
111 0224              ; IN AC1
112 0224 0A80 A $DONE: PFLG     $SELFF     ;CLEAR SELX
113 0225 8905 A      LD       AC2,$SAV2   ;RESTORE AC2
114 0226 8D05 A      LD       AC3,$SAV3   ;RESTORE AC3
115 0227 0200 A      RTS
116 0228 8D04 A $OVFLW: LD       AC3,$H7000
117 0229 3F00 A      RADD     AC3,AC3     ;SET OVERFLOW
118 022A 21F9 A      JMP      $DONE
119 022B 0000 A $SAV2: .WORD 0
120 022C 0000 A $SAV3: .WORD 0
121 022D 7000 A $H7000: .WORD X'7000

```

IMPASP

```

122 022E      .PAGE  'TELETYPE I/O - GETC/PUTC'
123 022E      ;      TELETYPE DELAY CONSTANTS
124 022E 0029 A $TA   =      41
125 022E 0012 A $TB   =      18
126 022E 0070 A $TC   =     112
127 022E 0009 A $EA   =       9
128 022E 0016 A $EB   =      22
129 022E 0026 A $EC   =      38
130 022E 0038 A $TTYAD =     7*8

```

```

131 022E      .SPACE  5
132 022E      ;      TELETYPE TRANSMIT CHARACTER ROUTINE
133 022E      ;
134 022E 2947 A PUTC:  JSR      SAVE
135 022F 2D12 A LPC:   JSR@     PPUTC
136 0230 2110 A        JMP      DONE+2
137 0231 4C30 A        LI       R0,030
138 0232 293F A        JSR      $DELAY+1
139 0233 4E09 A        LI       R2,9
140 0234 4F38 A        LI       R3,$TTYAD
141 0235 0603 A        ROUT     3
142 0236 293A A $LP1:  JSR      $DELAY
143 0237 5829 A        ROL      R0,$TA
144 0238 4AFF A        AISZ     R2,-1
145 0239 2101 A        JMP      .+2
146 023A 2104 A        JMP      DONE
147 023B 59FF A        ROR      R1,1
148 023C 3481 A        RCPY     R1,R0
149 023D 0603 A        ROUT     3
150 023E 21F7 A        JMP      $LP1
151 023F 4CFF A DONE:  LI       R0,-1
152 0240 0603 A        ROUT     3
153 0241 213D A        JMP      RET
154 0242 7E59 A PPUTC: .WORD    07E59

```

```

155 0243      .SPACE  5
156 0243 2932 A ECHO GC: JSR      SAVE
157 0244 2D2A A LECO:   JSR@     PGECHO
158 0245 2127 A        JMP      $X
159 0246      ;      GET CHARACTER ROUTINE
160 0246 292F A GETC:  JSR      SAVE
161 0247 2D28 A LGET:  JSR@     PGETC
162 0248 2124 A        JMP      $X
163 0249 0A80 A        PFLG     2
164 024A 4F38 A        LI       R3,$TTYAD
165 024B 0605 A $25:   ROUT     5
166 024C 4E08 A        LI       R2,8
167 024D 0604 A        ROUT     4
168 024E 0402 A        RIN      2
169 024F 1201 A        BOC      2,.,+2
170 0250 21FD A        JMP      .-2
171 0251 4C09 A        LI       R0,$EA
172 0252 291F A        JSR      $DELAY+1
173 0253 58EA A        ROR      R0,$EB
174 0254 0402 A        RIN      2
175 0255 1201 A        BOC      2,.,+2
176 0256 21F4 A        JMP      $25
177 0257 792D A $LP2:  ISZ      FLAG
178 0258 7D2C A        DSZ      FLAG
179 0259 2101 A        JMP      .+2

```

IMPASP

```

180 025A 0603 A      ROUT      3
181 025B 2915 A      JSR        $DELAY
182 025C 5826 A      ROL        R0,$EC
183 025D 0402 A      RIN        2
184 025E 6125 A      AND        R0,X8000
185 025F 50FF A      SHR        R1,1
186 0260 3182 A      RXOR       R0,R1
187 0261 4AFF A      AISZ       R2,-1
188 0262 21F4 A      JMP        $L2
189 0263 7921 A      ISZ        FLAG
190 0264 7D20 A      DSZ        FLAG
191 0265 2104 A      JMP        $11
192 0266 0603 A      ROUT      3
193 0267 2909 A      JSR        $DELAY
194 0268 4CFF A      LI         R0,-1
195 0269 0603 A      ROUT      3
196 026A          $11:
197 026A 2906 A      JSR        $DELAY
198 026B 50F8 A      SHR        R1,8
199 026C 3481 A      RCPY       R1,R0
200 026D A10D A      $X:      ST         R0,$REG
201 026E 2110 A      JMP        RET
202 026F 7E73 A      PGECO:    .WORD    07E73
203 0270 7E3B A      PGETC:    .WORD    07E3B

```

```

204 0271          .SPACE 5
205 0271          ;          DELAY ROUTINE
206 0271          ;
207 0271          $DELAY:
208 0271 4C12 A      LI         R0,$TB
209 0272 5890 A      ROR        R0,$TC
210 0273 48FF A      AISZ       R0,-1
211 0274 21FD A      JMP        .-2
212 0275 0200 A      RTS

```

```

213 0276          .SPACE 5
214 0276          ;          SAVE AND RESTORE REGISTERS ROUTINE
215 0276          ;
216 0276 A104 A      SAVE:    ST         R0,$REG
217 0277 A504 A      ST         R1,$REG+1
218 0278 A904 A      ST         R2,$REG+2
219 0279 AD04 A      ST         R3,$REG+3
220 027A 0200 A      RTS
221 027B 027F A      $REG:    .=. +4
222 027F          ;
223 027F 81FB A      RET:      LD         R0,$REG
224 0280 85FB A      LD         R1,$REG+1
225 0281 89FB A      LD         R2,$REG+2
226 0282 8DFB A      LD         R3,$REG+3
227 0283 0200 A      RTS
228 0284          ;
229 0284 8000 A      X8000:    .WORD    08000
230 0285 0286 A      FLAG:    .=. +1

```

```

231 0286          .PAGE      '16L INITIALIZATION ROUTINE'
232 0286          ;
233 0286          ; 16L INITIALIZATION ROUTINE
234 0286          ;
235 0286          LINIT:
236 0286          ;

```

IMPASP

```

237 0286 810C A      LD      R0,LPCC
238 0287 B111 A      ST      R0,@LLL
239 0288 810B A      LD      R0,LPCC+1
240 0289 B110 A      ST      R0,@LLL+1
241 028A          ;
242 028A 810A A      LD      R0,LECC
243 028B B10F A      ST      R0,@LLL+2
244 028C 8109 A      LD      R0,LECC+1
245 028D B10E A      ST      R0,@LLL+3
246 028E          ;
247 028E 8108 A      LD      R0,LGETC
248 028F B10D A      ST      R0,@LLL+4
249 0290 8107 A      LD      R0,LGETC+1
250 0291 B10C A      ST      R0,@LLL+5
251 0292 0200 A      RTS
252 0293          ;
253 0293          ;
254 0293 3181 A LPCC:  RCPY    R0,R1
255 0294 0A80 A      PFLG    2
256 0295          ;
257 0295 4F00 A LECOC:  LI     R3,0
258 0296 2102 A      JMP     .+3
259 0297          ;
260 0297 4F01 A LGETC:  LI     R3,1
261 0298 AD3C A      ST      R3,.*X'3D
262 0299 022F A LLL:   .WORD   LPC,LPC+1,LECO,LECO+1,LGET,LGET+1
      029A 0230 A
      029B 0244 A
      029C 0245 A
      029D 0247 A
      029E 0248 A
263 029F          RDCRD:
264 029F          WDSKTM:
265 029F          WDSKOB:
266 029F          RDSKIN:
267 029F          RDSKTM:
268 029F          HSPRT:
269 029F          MESS:
270 029F          CLOSET:
271 029F          CLOSEO:
272 029F 0000 A      HALT
273 02A0 21FE A      JMP     .-1
274 02A1          .ENDIF
275 02A1          .END

```

***** 0 ERRORS IN ASSEMBLY *****

```

$11    $25    $BIT0  $COUN  $DELA  $DONE  $EA    $EB    $EC    $GOES
026A A 024B A 0003 A 0205 A 0271 A 0224 A 0009 A 0016 A 0026 A 0219 A

$H700  $LOOP  $LP1    $LP2    $NRGT  $OVFL  $POOL  $PSIG  $REG  $S2
022D A 01F7 A 0236 A 0257 A 000B A 0228 A 0211 A 0002 A 027B A 0203 A

$S3    $SAV2  $SAV3  $SELF  $SHFT  $TA    $TB    $TC    $TTYA  $X
0204 A 022B A 022C A 0002 A 021D A 0029 A 0012 A 0070 A 0038 A 026D A

ABST   AC0    AC1    AC2    AC3    B1EQ1  CLOEO  CLOSET  DIVD  DONE
0021 A 0000 A 0001 A 0002 A 0003 A 0004 A 029F A 029F A 0206 A 023F A

DSKERR DSKIN  DSKOBJ  DSKTMP  ECHOGC  FLAG   GETC   HSPRT  INBUFB  INBUFE
0022 A 001F A 001E A 0020 A 0243 A 0285 A 0246 A 029F A 0012 A 0013 A

LECO   LECOC  LGET   LGETC  LINIT  LLL    LPC    LPCC   MESS   MULT
0244 A 0295 A 0247 A 0297 A 0286 A 0299 A 022F A 0293 A 029F A 01F0 A

```

IMPASP

NZ ODD P PGECO PGETC PPUTC PRINT PUTC RO R1
 0005 A 0003 A 0002 A 026F A 0270 A 0242 A 001A A 022E A 0000 A 0001 A

R2 R3 RDCRD RDSKIN RDSKTM RET SAVE SIZE4 SIZE8 WDSKOB
 0002 A 0003 A 029F A 029F A 029F A 027F A 0276 A 0001 A FFFF A 029F A

WDSKTM X8000 Z
 029F A 0284 A 0001 A

864C 14E1

IMPASM

IMPASM

REVISION-G 01/02/74
IMPASM 0000300C 6/25/74

```

1 0000 .TITLE IMPASM,'0000300C 6/25/74'
2 0000 ;
3 0000 ;*****
4 0000 ;
5 0000 ; SIZE8=-1 IF 4K VERSION
6 0000 ; SIZE8=1 IF 8K VERSION
7 0000 FFFF A SIZE8 = -1
8 0000 0001 A SIZE4 = -SIZE8
9 0000 0FFF A STTOP = 4095
10 0000 0000 A DBGVER = 0
11 0000 .ENDIF
12 0000 .BSECT
13 0000 000C A PNCHMD = 0C ; DEBUG ALSO USES THIS LOCATION
14 0000 000D B .=.+0D
15 0000 000E B MULT: .=.+1
16 0000 000F B DIVD: .=.+1
17 0000 0010 B GETC: .=.+1
18 0010 0011 B PUTC: .=.+1
19 0011 0012 B RDCRD: .=.+1
20 0012 0120 A INBUFB: .WORD INBUF
21 0013 016F A INBUFE: .WORD INBUF+79
22 0014 0015 B ECHOGC: .=.+1
23 0015 0016 B LINIT: .=.+1
24 0016 0017 B WDSKTM: .=.+1
25 0017 0018 B WDSKOB: .=.+1
26 0018 0019 B RDSKIN: .=.+1
27 0019 001A B RDSKTM: .=.+1
28 001A 001B B HSPRT: .=.+1
29 001B 001C B MESS: .=.+1
30 001C 001D B CLOSET: .=.+1
31 001D 001E B CLOSEO: .=.+1
32 001E FFFE A DSKOBJ: .WORD -2
33 001F FFFE A DSKIN: .WORD -2
34 0020 FFFE A DSKTMP: .WORD -2
35 0021 0ED6 A ABST: .WORD BADSTB ; BAD SECTOR TABLE
36 0022 0D17 A .WORD DSKERR
37 0023 ;*****
38 0023 ;
39 0023 ;
40 0023 ;
41 0023 ; BOC ASSIGNMENTS
42 0023 0001 A Z=1
43 0023 0002 A P=2
44 0023 0003 A ODD=3
45 0023 0004 A B1EQ1=4
46 0023 0005 A NZ=5
47 0023 000B A LEZ=11
48 0023 ;
49 0023 0000 A R0=0
50 0023 0001 A R1=1
51 0023 0002 A R2=2

52 0023 0003 A R3=3
53 0023 8000 A S=08000
54 0023 0008 A ELIM=8 ;NUMBER OF ERRORS LIMIT FOR EACH STATEMENT

55 0023 .PAGE 'CONSTANTS'
56 0023 0000 A ZERO: .WORD 0
57 0024 00FF A K255: .WORD 255

```


IMPASM

```

58 0025 000B A K11: .WORD 11
59 0026 0001 A K1: .WORD 1
60 0027 0003 A K3: .WORD 3
61 0028 0006 A K6: .WORD 6
62 0029 0008 A K8: .WORD 8
63 002A 0007 A K7: .WORD 7
64 002B 0009 A K9: .WORD 9
65 002C 0004 A K4: .WORD 4
66 002D 000F A K15: .WORD 15
67 002E FFF0 A XFFF0: .WORD 0FFF0
68 002F FFF7 A XFFF7: .WORD 0FFF7
69 0030 8000 A X8000: .WORD 08000
70 0031 6666 A X6666: .WORD 06666
71 0032 0040 A HEX40: .WORD 040
72 0033 005A A HEX5A: .WORD 05A
73 0034 0020 A HEX20: .WORD 020
74 0035 002F A HEX2F: .WORD 02F
75 0036 0039 A HEX39: .WORD 039
76 0037 0046 A HEX46: .WORD 046
77 0038 0030 A HEX30: .WORD 030
78 0039 0037 A HEX37: .WORD 037
79 003A 007F A HEX7F: .WORD 07F
80 003B 003F A HEX3F: .WORD 03F
81 003C 002A A HEX2A: .WORD 02A
82 003D 0400 A HEX400: .WORD 0400
83 003E 1000 A X1000: .WORD 01000
84 003F 0100 A K256: .WORD 256
85 0040 0002 A K2: .WORD 2
86 0041 0010 A K16: .WORD 16
87 0042 FF00 A XFF00: .WORD 0FF00
88 0043 0029 A RPAREN: .WORD ')' /256
89 0044 0058 A CHARX: .WORD 'X' /256
90 0045 0027 A QUOTE: .WORD '"' /256
91 0046 0028 A LPAREN: .WORD '(' /256
92 0047 000D A CR: .WORD 0D
93 0048 2020 A BLANKS: .WORD ' '
94 0049 003B A SEMI: .WORD ';' /256
95 004A 002E A DOT: .WORD '.' /256
96 004B 003A A COLAN: .WORD ':' /256
97 004C 003D A EQUAL: .WORD '=' /256
98 004D 5C00 A SHLIN: SHL R0,0
99 004E 0024 A DOLLAR: .WORD '$' /256
100 004F 002C A COMMA: .WORD ',' /256
101 0050 002B A CPLUS: .WORD '+' /256
102 0051 002D A CMINUS: .WORD '-' /256
103 0052 0025 A CNOT: .WORD '%' /256
104 0053 0026 A CAND: .WORD '&' /256
105 0054 0021 A COR: .WORD '!' /256
106 0055 0D71 A ERBAS: .WORD ERBUF

107 0056 ;
108 0056 0034 B BLANK = HEX20 ; ' ' /256
109 0056 0038 B CZERO = HEX30 ; '0' /256
110 0056 0032 B CAT = HEX40 ; '@' /256
111 0056 003C B CMPY = HEX2A ; '*' /256
112 0056 0035 B CDIV = HEX2F ; '/' /256

113 0056 .PAGE 'VARIABLES'
114 0056 ; ACTR,BCTR,TCTR, MUST BE IN THAT SEQUENCE
115 0056 0000 A ACTR: .WORD 0 ;ASECT LOC CTR
116 0057 0000 A BCTR: .WORD 0 ;BSECT LOC CTR
117 0058 0000 A TCTR: .WORD 0 ;TSECT LOC CTR
118 0059 005A B AMAX: .=.+1
119 005A 005B B BMAX: .=.+1

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IMPASM

```

120 0058 005C B TMAX:      .+.1
121 005C 0000 A LOCCTR:    .WORD      0      ;CURRENT LOC CTR
122 005D 0000 A PASS:      .WORD      0      ;PASS1 =0 , PASS2 =NON ZERO
123 005E 0120 A INPTR:     .WORD      INBUF    ;POINTS TO NEXT INPUT CHAR.
124 005F 0060 B LCPTR:     .+.1      ;LAST ACTIVE CHAR PTR (USED BY ERROR)
125 0060 0000 A BASE:      .WORD      0
126 0061 0000 A TOP:       .WORD      0
127 0062 0000 A NEXT:      .WORD      0
128 0063 0ED6 A BASEA:     .WORD      STBAS
129 0064 0FFF A TOPA:      .WORD      STTOP
130 0065 0FFF A NEXTA:     .WORD      STTOP
131 0066 0ED6 A BASEB:     .WORD      STBAS
132 0067 0FFF A TOPB:      .WORD      STTOP
133 0068 0FFF A NEXTB:     .WORD      STTOP
134 0069 006A B XINOK:     .+.1      ;EXTENDED INSTRUCTIONS OK? 0=NO
135 006A 006B B MOFLAG:    .+.1      ;MULTIPLE OUTPUT FLAG 0=1ST 1=SUBSEQ.
136 006B 0003 A SECT:      .WORD      3      ;SECTION 1=ASECT 2=BSECT 3=TSECT
137 006C 0000 A LOCREG:    .WORD      0      ;LOCAL REGION NUMBER (0 TO 255)
138 006D 018E A IFPTR:     .WORD      IFTAB-1
139 006E 018E A IFPTRA:    .WORD      IFTAB-1      ;INITIALIZATION FOR IFPTR
140 006F 0000 A IFSTAT:    .WORD      0      ;IFSTATUS 0=ENDIF LAST 2=IF LAST 4=ELSE LAST
141 0070 0001 A IFMODE:    .WORD      1      ;0=SKIP 1=NO SKIP
142 0071 003C A PGR:       .WORD      60      ;NUM OF LINES REMAINING ON PAGE
143 0072 0000 A IVAL:      .WORD      0      ;INSTR. VALUE FROM DI TABLE
144 0073 0000 A ICLASS:    .WORD      0      ;INSTR CLASS DI TABLE
145 0074 0000 A FORMPT:    .WORD      0      ;SYMBOL TABLE FORM PTR
146 0075 0076 B FORMB:     .+.1      ;FORM BEGIN FIELD BITS
147 0076 0077 B FORMT:     .+.1      ;FORM TERMINAL FIELD BITS
148 0077 0078 B FORMM:     .+.1      ;FORM FIELD MASK
149 0078 0079 B FORMBN:    .+.1      ;FORM BEGINNING BIT NUMBER
150 0079 007A B FORMTN:    .+.1      ;FORM TERMINAL BIT NUM.
151 007A 0000 A EXPVAL:    .WORD      0      ;VALUE FROM EXP.ROUTINES
152 007B 007C B EXPPD:     .+.1      ;EXP PREVIOUS DEF FLAG
153 007C 007D B EXPREL:    .+.1      ;EXP RELOCATION CODE
154 007D 0000 A NAM0:      .WORD      0
155 007E 0000 A NAM1:      .WORD      0
156 007F 0000 A NAM2:      .WORD      0
157 0080 0000 A CNAM0:     .WORD      0
158 0081 0000 A CNAM1:     .WORD      0
159 0082 0083 B STVAL:     .+.1      ;SYMBOL TABLE VALUE
160 0083 0084 B STPDEF:    .+.1      ;SYMBOL TABLE PREV. DEFINITION FLAG
161 0084 0085 B STREL:     .+.1      ;SYMBOL TABLE RELOCATION FLAG
162 0085 0086 B STPT:      .+.1      ;SYMBOL TABLE PRT.
163 0086 0087 B ITVAL:     .+.1      ;ITEM VALUE
164 0087 0088 B ITREL:     .+.1      ;ITEM RELOCATION

165 0088 0089 B EC:        .+.1      ;ERROR COUNT
166 0089 0001 A INDEV:     .WORD      1      ;INPUT DEVICE 0=CR 1=KB 2=PT
167 008A 008B B LBLPT:     .+.1      ;LABEL PRT, USED BY ASSIGN DIRECTIVE
168 008B 008C B ERRPT:     .+.1      ;POINTS TO NEXT ERROR ENTRY
169 008C 008D B LCNT1:     .+.1      ;DEC LINE CNT FOR PRINTING1 (0/256)
170 008D 008E B LCNT2:     .+.1      ;DEC LINE CNT FOR PRINTING2 (06666=0)
171 008E 008F B LISTMD:    .+.1      ;VALUE FROM LAST LIST DIRECTIVE
172 008F 0001 A ERRLIST:   .WORD      1      ;ERROR LISTING REQUESTED 1=NO 0=YES
173 0090 0091 B OBJMOD:    .+.1      ;0=NO OBJECT MODULE NZ=OBJ MOD
174 0091 0001 A NOLIST:    .WORD      1      ;0=NO LISTING
175 0092 0093 B NOCOM:     .+.1      ;';'=NO COMMENT PRINTING
176 0093 0094 B NOMAP:     .+.1      ; NO MAP FLAG 0=NONE
177 0094 FFFE A IDSKIN:    .WORD      -2      ; -2=NO, OTHER=INITIAL LOGICAL SECTION
178 0095 FFFE A IDSKTM:    .WORD      -2      ; -2=NO, OTHER=INITIAL LOGICAL SECTION
179 0096 0000 A HSPR:      .WORD      0      ; 1=NO, 0=HIGH SPEED PRINTER
180 0097 0000 A TYPMOD:    .WORD      0      ; 0=PRINT, NZ=TYPE OR PUNCH

181 0098 .PAGE 'INITIALIZATION AND START'

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IMPASM

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182 0098          .LOCAL
183 0098          ;*****
184 0098          .ASECT
185 0000          .IF      SIZE4
186 0000 0120 A      . = 0120
187 0120 0170 A INBUF: . = +80
188 0170 018E A PGSTRG: . = +30          ;PAGE STRING BUFFER
189 018E 018F A      . = +1
190 018F 0199 A IFTAB: . = +10          ;IF TABLE
191 0199 01DA A PTRTAB: . = +65
192 01DA          PTREND:
193 01DA 01EC A TTLBUF: . = +18
194 01EC 0000 A      .WORD      0
195 01ED 02B0 A      . = 02B0
196 02B0          ;*****
197 02B0          ;
198 02B0          START:
199 02B0          ;      IMP 16/L TEST
200 02B0 8D32 A      LD      R3,HEX760
201 02B1 0418 A      RIN      018
202 02B2 4801 A      AISZ     R0,1
203 02B3 2C15 B      JSR      @LINIT
204 02B4          ;
205 02B4 4C01 A      LI      R0,1
206 02B5 A089 B      ST      R0,INDEV
207 02B6 A096 B      ST      R0,HSPR
208 02B7 A097 B      ST      R0,TYPMOD
209 02B8 4C00 A      LI      R0,0
210 02B9 A00C A      ST      R0,PNCHMD
211 02BA A05D B      ST      R0,PASS
212 02BB 9C98 I      LD      R3,MSGBEG
213 02BC 2C99 I      JSR      ONLMSG
214 02BD          ;      READ MEMORY SIZE
215 02BD 2C9A I      JSR      RDTTY
216 02BE 21F1 A      JMP      START
217 02BF 290E A      JSR      GSIZE
218 02C0 210A A      JMP      $2          ;USE DEFAULT SIZE
219 02C1 1101 A      BOC      Z, .+2
220 02C2 A063 B      ST      R0,BASEA
221 02C3 A464 B      ST      R1,TOPA
222 02C4 A467 B      ST      R1,TOPB
223 02C5 2C98 I      JSR      GCOMMA
224 02C6 2104 A      JMP      $2
225 02C7 2906 A      JSR      GSIZE          ;GET ALTERNATE REGION SIZE
226 02C8 2102 A      JMP      $2
227 02C9 A066 B      ST      R0,BASEB
228 02CA A467 B      ST      R1,TOPB
229 02CB          $2:
230 02CB 2C9C I      JSR      GNVC
231 02CC 2118 A      JMP      NEWASM
232 02CD 21E2 A      JMP      START          ;ERROR-EXTRA DATA

233 02CE          ;      END OF MEMORY SIZE INPUT
234 02CE          ;
235 02CE          ;      GET SIZE PAIR
236 02CE          ;
237 02CE          GSIZE:
238 02CE 290E A      JSR      $GDEC
239 02CF 0200 A      RTS
240 02D0 A511 A      ST      R1,$TMP
241 02D1 2C9C I      JSR      GNVC
242 02D2 2108 A      JMP      $3
243 02D3 F04B B      SKNE     R0,COLAN
244 02D4 2101 A      JMP      .+2

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245 02D5 2105 A      JMP      $3              ;FORCE ERROR
246 02D6 2906 A      JSR      $GDEC
247 02D7 2103 A      JMP      $3              ;FORCE ERROR
248 02D8 8109 A      LD       R0,$TMP
249 02D9 D426 B      SUB      R1,R1
250 02DA 0201 A      RTS      1
251 02DB 7C5E B $3:   DSZ      INPTR          ;INPUT CHAR PTR ;FORCE ERROR
252 02DC 0200 A      RTS      0
253 02DD ;
254 02DD ;      GET DECIMAL VAL FOR SIZE
255 02DD ;
256 02DD 2C9D I $GDEC: JSR      GITEM
257 02DE 0200 A      RTS
258 02DF 8486 B      LD       R1,ITVAL
259 02E0 5D0A A      SHL      R1,10          ;VAL*1024
260 02E1 0201 A      RTS      1
261 02E2 02E3 A $TMP: .=. +1
262 02E3 0760 A HEX760: .WORD 0760
263 02E4 1E63 A LABST: .WORD 01E63

264 02E5 .PAGE 'NEW ASSEMBLY'
265 02E5 .LOCAL
266 02E5 ;
267 02E5 ;      BEGIN NEW ASSEMBLY
268 02E5 ;
269 02E5 4C00 A NEWASM: LI      R0,0
270 02E6 A00C A      ST       R0,PNCMD
271 02E7 A05D B      ST       R0,PASS          ; 0=PASS 1
272 02E8 A069 B      ST       R0,XINOK        ; 0= EXTENDED INSTR ILLEGAL
273 02E9 A090 B      ST       R0,OBJMOD
274 02EA A05A B      ST       R0,BMAX
275 02EB A05B B      ST       R0,TMAX
276 02EC B09E I      ST       R0,PTRTAB      ;EMPTY POINTER TABLE
277 02ED B09F I      ST       R0,PTREND-1
278 02EE B0A0 I      ST       R0,TTLBUF+7
279 02EF 8064 B      LD       R0,TOPA
280 02F0 A065 B      ST       R0,NEXTA
281 02F1 8067 B      LD       R0,TOPB
282 02F2 A068 B      ST       R0,NEXTB
283 02F3 4C01 A      LI      R0,1
284 02F4 A093 B      ST       R0,NOMAP
285 02F5 A097 B      ST       R0,TYPMOD
286 02F6 A089 B      ST       R0,INDEV        ;INPUT DEVICE 0=CR,1=KB,2=PT ;SET INPU
287 02F7 A091 B      ST       R0,NOLIST      ;SET LISTING MODE
288 02F8 A08E B      ST       R0,LISTMD
289 02F9 A08F B      ST       R0,ERRLST
290 02FA A096 B      ST       R0,HSPR
291 02FB 4CFE A      LI      R0,-2
292 02FC A094 B      ST       R0,IDSKIN
293 02FD A095 B      ST       R0,IDSKTM
294 02FE A01E B      ST       R0,DSKOBJ
295 02FF 4C05 A      LI      R0,5
296 0300 B0A1 I      ST       R0,TTLBUF
297 0301 8138 A      LD       R0,$MAIN
298 0302 B0A2 I      ST       R0,TTLBUF+4
299 0303 8137 A      LD       R0,$MAIN+1
300 0304 B0A3 I      ST       R0,TTLBUF+5
301 0305 8136 A      LD       R0,$MAIN+2
302 0306 B0A4 I      ST       R0,TTLBUF+6
303 0307 A092 B      ST       R0,NOCOM
304 0308 4FF5 A      LI      R3,-11
305 0309 8048 B      LD       R0,BLANKS
306 030A 890F A      LD       R2,$TTL
307 030B A200 A      ST       R0,0(R2)

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IMPASM

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308 030C 4A01 A      AISZ    R2,1
309 030D 4B01 A      AISZ    R3,1
310 030E 21FC A      JMP     .-3
311 030F 4F06 A      LI      R3,6
312 0310 2CA5 I      JSR     MANYNL
313 0311 9CA6 I      LD      R3,MSGNXT
314 0312 2C99 I      JSR     ONLMSG      ; 'NEXT ASSEMBLY *.ASM'
315 0313              ;

316 0313              ;      INPUT CONTROL STATEMENT
317 0313 2C9A I      JSR     RDTTY
318 0314 21D0 A      JMP     NEWASM
319 0315 2CA7 I      JSR     PRCTRL      ; PROCESS CONTROL STATEMENT
320 0316 21CE A      JMP     NEWASM
321 0317 2903 A      JSR     PINIT
322 0318 2CA8 I      JSR     NEWLIN
323 0319 2132 A      JMP     NEXTST
324 031A 01E1 A $TTL: .WORD    TTLBUF+7
325 031B              ;
326 031B              ;      PASS INITIALIZATION
327 031B              ;
328 031B 4D03 A PINIT: LI      R1,3
329 031C A46B B      ST      R1,SECT      ; SECT:=TSECT
330 031D 4D01 A      LI      R1,1
331 031E A48E B      ST      R1,LISTMD
332 031F A470 B      ST      R1,IFMODE
333 0320 4C00 A      LI      R0,0
334 0321 A00C A      ST      R0,PNCHMD
335 0322 B0A9 I      ST      R0,PGSTRG      ; RESET PAGE STRING
336 0323 A06F B      ST      R0,IFSTAT
337 0324 A06C B      ST      R0,LOCREG      ; LOCAL REGION NUMBER
338 0325 A056 B      ST      R0,ACTR
339 0326 A057 B      ST      R0,BCTR
340 0327 A058 B      ST      R0,TCTR
341 0328 A05C B      ST      R0,LOCCTR
342 0329 B0AA I      ST      R0,SOUCK      ; SOURCE CHECKSUM
343 032A B0AB I      ST      R0,OBJCK      ; OBJECT CHECKSUM
344 032B 846E B      LD      R1,IFPTRA
345 032C A46D B      ST      R1,IFPTR
346 032D 8431 B      LD      R1,X6666
347 032E A488 B      ST      R1,EC
348 032F A48D B      ST      R1,LCNT2
349 0330 4D30 A      LI      R1,'0'/256
350 0331 A48C B      ST      R1,LCNT1
351 0332 4D37 A      LI      R1,55
352 0333 A471 B      ST      R1,PGRL
353 0334 8094 B      LD      R0,IDSKIN
354 0335 A01F B      ST      R0,DSKIN
355 0336 8095 B      LD      R0,IDSKTM
356 0337 A020 B      ST      R0,DSKTMP
357 0338 2CAC I      JSR     INITOR      ; INITIALIZE OBJECT RECORD
358 0339 0200 A      RTS
359 033A 4D41 A $MAIN: .ASCII  'MAINPR'
      033B 494E A
      033C 5052 A

360 033D              .PAGE    'STATEMENT PROCESS AND FORM USAGE'
361 033D              .LOCAL
362 033D              ;
363 033D              ;      STATEMENT PROCESS
364 033D              ;
365 033D              ;
366 033D 0AF2 A $XARG: .WORD    XARGCK
367 033E 2042 A $CB:  .WORD    ' B'

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IMPASM

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368 033F 4C18 A XERROR: LI      R0,24;          SYNTAX ERROR      ;SYNTAX ERROR
369 0340      ;
370 0340 2CAD I XERR1: JSR      ERROR
371 0341      ;
372 0341 2105 A      JMP      DIREND
373 0342 2CAD I ERRST: JSR      ERROR
374 0343 4C00 A      LI       R0,0
375 0344 4D01 A INABS: LI       R1,1          ;ABS
376 0345 2CAE I INOUT: JSR     OUTWRD
377 0346 2103 A      JMP      ENDST
378 0347      ;
379 0347 2DF5 A DIREND: JSR     @$XARG
380 0348 2CAF I      JSR     OIBREP          ;OUTPUT INPUT BUFFER AND REPORT ERRORS
381 0349 2102 A      JMP      NEXTST
382 034A 2DF2 A ENDST: JSR     @$XARG
383 034B 2CB0 I      JSR     REPERR          ;REPORT ERRORS
384 034C      NEXTST:
385 034C 8096 B      LD       R0,HSPR
386 034D A097 B      ST       R0,TYPMOD
387 034E 8055 B      LD       R0,ERRBAS
388 034F A08B B      ST       R0,ERRPT
389 0350 4C00 A      LI       R0,0
390 0351 A06A B      ST       R0,MOFLAG
391 0352 4DF1 A      LI       R1,-15
392 0353 4400 A      PULL     R0
393 0354 4901 A      AISZ     R1,1
394 0355 21FD A      JMP      .-2
395 0356 81E7 A      LD       R0,$CB
396 0357 B0B1 I      ST       R0,RELTB+3      ;REPLACE B IN ENTRY WHICH MAY HAVE I
397 0358      ;
398 0358      ;
399 0358 2CB2 I      JSR      READ
400 0359 2C9C I NEXTLB: JSR     GNVC          ;GET NEXT VALID CHAR
401 035A 21EC A      JMP      DIREND          ;FINISH STATEMENT (END OF STAT)
402 035B F04A B      SKNE     R0,DOT
403 035C 2108 A      JMP      $DOT          ; DIRECTIVE OR .=
404 035D      ; LABEL, INSTR OR FORM
405 035D 2CB3 I      JSR      BLDNAM          ;BUILD NAME
406 035E 21E0 A      JMP      XERROR          ;NO NAME
407 035F F04B B      SKNE     R0,COLAN
408 0360 24B4 I      JMP      LABEL          ; LABEL
409 0361 F04C B      SKNE     R0,EQUAL
410 0362 24B5 I      JMP      ASSIGN          ;ASSIGN DIRECTIVE
411 0363 2CB6 I      JSR      IFBYP          ;IF BYPASS?

412 0364 2108 A      JMP      $SERCH          ;INSTR OR FORM SEARCH
413 0365 2C9C I $DOT: JSR     GNVC
414 0366 21D8 A      JMP      XERROR
415 0367 F04C B      SKNE     R0,EQUAL
416 0368 24B7 I      JMP      DOTASN
417 0369 7C5E B      DSZ      INPTR          ;INPUT CHAR PTR
418 036A 4C2E A      LI       R0,'./256
419 036B 2CB8 I      JSR      BLDDIR
420 036C 21D2 A      JMP      XERROR
421 036D      ; DIRECTIVE OR INSTR OR FORM SEARCH
422 036D 2CB9 I $SERCH: JSR     DISER
423 036E 2107 A      JMP      $5A
424 036F      ; MATCH FOUND
425 036F 8300 A      LD       R0,0(R3)
426 0370 8701 A      LD       R1,1(R3)
427 0371 A072 B      ST       R0,IVAL
428 0372 A473 B      ST       R1,ICLASS
429 0373 8069 B      LD       R0,XINOK      ;EXTENDED INST OK FLAG (0=NO)
430 0374 3681 A      RCPY     R1,R2

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IMPASM

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431 0375 2200 A      JMP      0(R2)
432 0376             $5A:
433 0376             .IF      SIZE4
434 0376 4C2A A      LI       R0,42
435 0377 21CA A      JMP      ERRST

436 0378             .PAGE    'END DIRECTIVE'
437 0378             .LOCAL
438 0378 2031 A $X2031: .WORD    02031
439 0379             ;
440 0379             ;      END DIRECTIVE
441 0379             ;
442 0379             END:
443 0379 2CBA I      JSR      OOREC      ;OUTPUT OBJECT RECORD IF ANY
444 037A 2CBB I      JSR      EXP
445 037B 3081 A      NOP
446 037C 3881 A      RCPY      R2,R0
447 037D 1502 A      BOC      NZ,+.3
448 037E 4C2A A      LI       R0,42;      UNDEFINED ERROR
449 037F 2CAD I      JSR      ERROR
450 0380 8C6B B      LD       R3,SECT
451 0381 805C B      LD       R0,LOCCTR
452 0382 A355 B      ST       R0,ACTR-1(R3)
453 0383 8758 B      LD       R1,AMAX-1(R3)
454 0384 2CBC I      JSR      MAXR1      ;SET R1 = MAX OF R1 AND R0
455 0385 A758 B      ST       R1,AMAX-1(R3)
456 0386 806D B      LD       R0,IFPTR
457 0387 F06E B      SKNE     R0,IFPTRA
458 0388 2102 A      JMP      .+3
459 0389 4C12 A      LI       R0,18;      NESTING USAGE ERROR
460 038A 2CAD I      JSR      ERROR
461 038B 807A B      LD       R0,EXPVAL
462 038C 2CBD I      JSR      OVAL
463 038D 2CAF I      JSR      OIBREP      ;OUTPUT INPUT BUFFER,REPORT ERRS.
464 038E 805D B      LD       R0,PASS
465 038F C1E8 A      ADD      R0,$X2031
466 0390 B0BE I      ST       R0,MSGP
467 0391 805D B      LD       R0,PASS
468 0392 1102 A      BOC      Z,ENDP1
469 0393 144F A      BOC      B1EQ1,ENDP3
470 0394 131C A      BOC      ODD,ENDP2
471 0395             ;
472 0395             ;      END PASS 1
473 0395             ;
474 0395             ENDP1:
475 0395 4C00 A      LI       R0,0
476 0396 A14A A      ST       R0,TLAST
477 0397 A14A A      ST       R0,OLAST
478 0398 4D01 A      LI       R1,1
479 0399 8091 B      LD       R0,NOLIST
480 039A C08F B      ADD      R0,ERRLIST
481 039B D026 B      SUB      R0,K1
482 039C 1501 A      BOC      NZ,+.2
483 039D 4D02 A      LI       R1,2
484 039E A45D B      ST       R1,PASS
485 039F 8020 B      LD       R0,DSKTMP
486 03A0 1B02 A      BOC      LEZ,$51
487 03A1 2C1C B      JSR      @CLOSET

488 03A2 A13E A      ST       R0,TLAST
489 03A3 8096 B $51:  LD       R0,HSPR
490 03A4 1502 A      BOC      NZ,+.3
491 03A5 8D5A A      LD       R3,$TTL
492 03A6 2C1B B      JSR      @MESS

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493 03A7 2960 A      JSR      OEPM
494 03A8 805D B      LD        R0,PASS
495 03A9 1410 A      BOC        BLEQ1,BEGP34      ;BEGIN PASS 3 OR 4
496 03AA              ;
497 03AA              ;      BEGIN PASS 2
498 03AA              ;
499 03AA 2CBF I      JSR      RESETP      ;RESET P BITS IN SYMBOL TABLE
500 03AB 2CC0 I      JSR      PINIT
501 03AC 808F B      LD        R0,ERRLST
502 03AD A08E B      ST        R0,LISTMD
503 03AE 4F06 A      LI        R3,6
504 03AF 2CA5 I      JSR      MANYNL
505 03B0 219B A      JMP        NEXTST
506 03B1              ;
507 03B1              ;      END PASS 2
508 03B1              ;
509 03B1      ENDP2:
510 03B1 2962 A      JSR      OPTRS      ;OUTPUT ALL POINTERS
511 03B2 8093 B      LD        R0,NOMAP
512 03B3 1102 A      BOC        Z,+.3
513 03B4 2CC1 I      JSR      OMAP
514 03B5 2101 A      JMP        .+2
515 03B6 2CBF I      JSR      RESETP
516 03B7 2919 A      JSR      $SEL
517 03B8 294F A      JSR      OEPM
518 03B9 785D B      ISZ        PASS
519 03BA      BEGP34:
520 03BA 8090 B      LD        R0,OBJMOD
521 03BB 113E A      BOC        Z,$FINIS
522 03BC 801E B      LD        R0,DSKOBJ
523 03BD 1206 A      BOC        P,$50
524 03BE 9CC2 I      LD        R3,MSGTO
525 03BF AC97 B      ST        R3,TYPMOD
526 03C0 2C99 I      JSR      ONLMSG
527 03C1 2CA8 I      JSR      NEWLIN
528 03C2 0000 A      HALT
529 03C3 2CC3 I      JSR      LEAD      ;WAIT FOR PT PUNCH ON
530 03C4              ;
531 03C4      $50:
532 03C4 805B B      LD        R0,TMAX
533 03C5 B0C4 I      ST        R0,TTLBUF+3
534 03C6 805A B      LD        R0,BMAX
535 03C7 B0C5 I      ST        R0,TTLBUF+2
536 03C8 8D37 A      LD        R3,$TTL
537 03C9 2CC6 I      JSR      CKPNCH      ;CHECKSUM AND PUNCH
538 03CA 2CC7 I      JSR      OGLOB
539 03CB 2CC0 I      JSR      PINIT

540 03CC 805D B      LD        R0,PASS
541 03CD 848F B      LD        R1,ERRLST
542 03CE F027 B      SKNE      R0,K3
543 03CF A48E B      ST        R1,LISTMD
544 03D0 24C8 I      JMP        NEXTST
545 03D1              ;
546 03D1              ;      OUTPUT ERROR LINES
547 03D1              ;
548 03D1 4C01 A      $SEL:  LI        R0,1
549 03D2 A08E B      ST        R0,LISTMD
550 03D3 2CA8 I      JSR      NEWLIN
551 03D4 8888 B      LD        R2,EC
552 03D5 4D20 A      LI        R1,020
553 03D6 8109 A      LD        R0,$NO
554 03D7 F831 B      SKNE      R2,X6666
555 03D8 2CC9 I      JSR      O2CH

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556 03D9 F831 B      SKNE      R2,X6666
557 03DA 2101 A      JMP       .+2
558 03DB 2CCA I      JSR       OSPDEC
559 03DC 9CCB I      LD        R3,MSGNOE      ; 'ERROR LINES'
560 03DD 2CCC I      JSR       OMSG
561 03DE 0200 A      RTS
562 03DF          ;
563 03DF 03E0 A $TMP:  .=.+1
564 03E0 4E4F A $NO:   .WORD      'NO'
565 03E1 03E2 A TLAST: .=.+1
566 03E2 03E3 A OLAST: .=.+1
567 03E3          ;
568 03E3          ;
569 03E3          ;
570 03E3          ENDP3:
571 03E3 2930 A      JSR       OPTRS
572 03E4          $OE:
573 03E4 4C01 A      LI        R0,1
574 03E5 A08E B      ST        R0,LISTMD
575 03E6 807A B      LD        R0,EXPVAL      ; EXPRESSION VALUE
576 03E7 A11D A      ST        R0,ENDBUF+3
577 03E8 807C B      LD        R0,EXPREL      ; EXPRESSION RELOCATION MODE
578 03E9 1101 A      BOC       Z, .+2
579 03EA D026 B      SUB       R0,K1
580 03EB A118 A      ST        R0,ENDBUF+2
581 03EC 8D14 A      LD        R3,$EB
582 03ED 2CC6 I      JSR       CKPNCH
583 03EE 801E B      LD        R0,DSKOBJ
584 03EF 1B03 A      BOC       LEZ, .+4
585 03F0 2C1D B      JSR       @CLOSEO
586 03F1 A1F0 A      ST        R0,OLAST
587 03F2 2102 A      JMP       .+3
588 03F3 2CC3 I      JSR       LEAD      ; OUTPUT LEADER TO PT
589 03F4 0000 A      HALT      ; WAIT FOR PT PUNCH OFF
590 03F5 2912 A      JSR       OEPM
591 03F6 8D6E A      LD        R3,MSGOCK      ; 'OBJECT CHECKSUM ='

592 03F7 2CCC I      JSR       OMSG
593 03F8 810E A      LD        R0,OBJCK      ; OBJECT CHECKSUM
594 03F9 2CCD I      JSR       OHEX
595 03FA          $FINIS:
596 03FA 24CE I $FIN1:  JMP       NEWASM
597 03FB          ;
598 03FB          ;
599 03FB 2CAF I ENDP4:  JSR       OIBREP      ; OUTPUT INPUT BUFFER, REPORT ERRS.
600 03FC 2917 A      JSR       OPTRS      ; OUTPUT POINTERS
601 03FD 2CC1 I      JSR       OMAP
602 03FE 21E5 A      JMP       $OE      ; OUTPUT END RECORD
603 03FF          ;
604 03FF 2031 A X2031: .WORD      02031
605 0400 01DA A $TTL:  .WORD      TTLBUF
606 0401 0402 A $EB:   .WORD      ENDBUF
607 0402 C004 A ENDBUF: .WORD      0C004
608 0403 0406 A      .=.+3
609 0406 0407 A SOUCK: .=.+1
610 0407 0408 A OBJCK: .=.+1
611 0408          ;
612 0408          ;      OUTPUT END PASS X MESSAGE
613 0408          ;
614 0408          OEPM:
615 0408 8D3C A      LD        R3,MSGEP
616 0409 AC97 B      ST        R3,TYPMOD
617 040A 2C99 I      JSR       ONLMSG      ; 'END PASS 1'
618 040B 8096 B      LD        R0,HSPR

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619 040C A097 B      ST      R0,TYPMOD
620 040D 813C A      LD      R0,MSGP
621 040E F1F0 A      SKNE    R0,X2031
622 040F 0200 A      RTS
623 0410 8D3B A      LD      R3,MSGSOV
624 0411 2C99 I      JSR     ONLMSG
625 0412 81F3 A      LD      R0,SOUCK
626 0413 24CD I      JMP     OHEX
627 0414             ;
628 0414             ;
629 0414             ;      OUTPUT POINTERS
630 0414             ;
631 0414             ;      OPTRS:
632 0414 2CA8 I      JSR     NEWLIN
633 0415 2CCF I      JSR     O6B
634 0416 4F02 A      LI      R3,2
635 0417 AC6B B      ST      R3,SECT
636 0418 8057 B      LD      R0,BCTR
637 0419 A05C B      ST      R0,LOCCTR
638 041A 9CD0 I      LD      R3,PTABF
639 041B ADC3 A      ST      R3,$TMP
640 041C 2CAC I      JSR     INITOR
641 041D             $NP:
642 041D 8DC1 A      LD      R3,$TMP
643 041E 8300 A      LD      R0,0(R3)

644 041F 1501 A      BOC     NZ,+.2
645 0420 24BA I      JMP     OOREC
646 0421 3181 A      RCPY    R0,R1
647 0422 8301 A      LD      R0,1(R3)
648 0423 2CAE I      JSR     OUTWRD
649 0424 79BA A      ISZ     $TMP
650 0425 79B9 A      ISZ     $TMP
651 0426 21F6 A      JMP     $NP      ;LOOP FOR NEXT PTR
652 0427             ;      END OF POINTER OUTPUT
653 0427             ;
654 0427 0428 A MSGBEG: .WORD   .+1
655 0428 4E53 A      .ASCII  'NSC IMP-16 ASSEMBLER'
        0429 4320 A
        042A 494D A
        042B 502D A
        042C 3136 A
        042D 2041 A
        042E 5353 A
        042F 454D A
        0430 424C A
        0431 4552 A
656 0432 0D0A A      .WORD   0D0A
657 0433 4D45 A      .ASCII  'MEMORY ='
        0434 4D4F A
        0435 5259 A
        0436 203D A
658 0437 0000 A      .WORD   0
659 0438 0439 A MSGNXT: .WORD   .+1
660 0439 4E45 A      .ASCII  'NEXT ASSEMBLY'
        043A 5854 A
        043B 2041 A
        043C 5353 A
        043D 454D A
        043E 424C A
        043F 5920 A
661 0440 0D0A A      .WORD   0D0A
662 0441 2A2E A      .ASCII  '*.ASM'
        0442 4153 A

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0443 4D20 A
663 0444 0000 A .WORD 0
664 0445 0446 A MSGEP: .WORD .+1
665 0446 454E A .ASCII 'END PASS'
0447 4420 A
0448 5041 A
0449 5353 A
666 044A 0000 A MSGP: .WORD 0
667 044B 0000 A .WORD 0
668 044C 044D A MSGSOV: .WORD .+1
669 044D 534F A .ASCII 'SOURCE CK.='
044E 5552 A
044F 4345 A
0450 2043 A

0451 4B2E A
0452 3D20 A
670 0453 0000 A .WORD 0
671 0454 0455 A MSGTO: .WORD .+1
672 0455 5455 A .ASCII 'TURN PT PUNCH ON AND PUSH RUN'
0456 524E A
0457 2050 A
0458 5420 A
0459 5055 A
045A 4E43 A
045B 4820 A
045C 4F4E A
045D 2041 A
045E 4E44 A
045F 2050 A
0460 5553 A
0461 4820 A
0462 5255 A
0463 4E20 A
673 0464 0000 A .WORD 0
674 0465 0466 A MSGOCK: .WORD .+1
675 0466 204F A .ASCII 'OBJ.CK.='
0467 424A A
0468 2E43 A
0469 4B2E A
046A 3D20 A
676 046B 0000 A .WORD 0
677 046C 046D A MSGNOE: .WORD .+1
678 046D 2045 A .ASCII 'ERROR LINES'
046E 5252 A
046F 4F52 A
0470 204C A
0471 494E A
0472 4553 A
679 0473 0000 A .WORD 0

680 0474 .PAGE 'IF,ELSE,ENDIF DIRECTIVES'
681 0474 .LOCAL
682 0474 ;
683 0474 ; IF,ELSE,ENDIF DIRECTIVES
684 0474 ;
685 0474 IF:
686 0474 8070 B LD R0,IFMODE
687 0475 C06F B ADD R0,IFSTAT
688 0476 8C6D B LD R3,IFPTR
689 0477 FD2D A SKNE R3,IFTBL
690 0478 210F A JMP $OV ;IF TABLE OVERFLOW
691 0479 786D B ISZ IFPTR
692 047A A301 A ST R0,1(R3)

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693 047B 4C02 A      LI      R0,2
694 047C A06F B      ST      R0,IFSTAT
695 047D 2CD1 I      JSR      EXPABS
696 047E 210C A      JMP      $NOEX          ;ERROR - NO EXP
697 047F E023 B      SKG      R0,ZERO
698 0480 4C00 A      LI      R0,0
699 0481 1101 A      BOC      Z,.,+2
700 0482 4C01 A $1:   LI      R0,1
701 0483 6070 B      AND      R0,IFMODE
702 0484 A070 B      ST      R0,IFMODE
703 0485 807A B      LD      R0,EXPVAL      ;EXPRESSION VALUE
704 0486 2CD2 I      JSR      OHEXIF
705 0487 24D3 I      JMP      DIREND
706 0488            ;
707 0488            ;      IF TABLE OVERFLOW
708 0488 4C24 A $OV:  LI      R0,36;          TABLE OVERFLOW ERROR
709 0489 2CAD I      JSR      ERROR
710 048A 24D3 I      JMP      DIREND
711 048B            ;      NO EXP ERROR
712 048B 4C2A A $NOEX: LI      R0,42;          UNDEFINED ERROR
713 048C 2CAD I      JSR      ERROR
714 048D 21F4 A      JMP      $1
715 048E            ;
716 048E            ;      ELSE DIRECTIVE
717 048E            ;
718 048E            ELSE:
719 048E 806F B      LD      R0,IFSTAT      ;IF STATUS
720 048F F040 B      SKNE     R0,K2
721 0490 2103 A      JMP      $EOK          ;ELSE OK
722 0491            ;      NESTING ERROR
723 0491 4C12 A $NERR: LI      R0,18;          NESTING - USAGE ERROR
724 0492 2CAD I      JSR      ERROR
725 0493 24D3 I      JMP      DIREND
726 0494            ;      ELSE OK
727 0494            $EOK:
728 0494 4C04 A      LI      R0,4
729 0495 A06F B      ST      R0,IFSTAT
730 0496 8070 B      LD      R0,IFMODE
731 0497 5000 A      CAI      R0,0

732 0498 6026 B      AND      R0,K1
733 0499 A070 B      ST      R0,IFMODE      ;COMPLEMENT IF MODE
734 049A 24D3 I      JMP      DIREND
735 049B            ;
736 049B            ;      ENDIF DIRECTIVE
737 049B            ;
738 049B            ENDIF:
739 049B 806F B      LD      R0,IFSTAT
740 049C 11F4 A      BOC      Z,$NERR      ;NESTING ERROR
741 049D 906D B      LD      R0,@IFPTR
742 049E 6026 B      AND      R0,K1
743 049F A070 B      ST      R0,IFMODE
744 04A0 906D B      LD      R0,@IFPTR
745 04A1 6028 B      AND      R0,K6          ;STATUS
746 04A2 A06F B      ST      R0,IFSTAT
747 04A3 7C6D B      DSZ      IFPTR
748 04A4 24D3 I      JMP      DIREND
749 04A5            ;
750 04A5 0198 A IFTBL: .WORD   IFTAB+9      ;IF TABLE LIMIT

751 04A6            .PAGE   'ASECT,BSECT,TSECT AND EXT0 DIRECTIVES'
752 04A6            ;
753 04A6            ;      ASECT,BAECT,TSECT, AND EXT0 DIRECTIVES
754 04A6            ;

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755 04A6          .LOCAL
756 04A6 4F01 A ASECT: LI      R3,1
757 04A7          $1:
758 04A7 2CB6 I     JSR      IFBYP
759 04A8 886B B     LD       R2,SECT
760 04A9 805C B     LD       R0,LOCCTR
761 04AA A255 B     ST       R0,ACTR-1(R2)
762 04AB 8658 B     LD       R1,AMAX-1(R2)
763 04AC 2910 A     JSR      MAXR1          ;SET R1 = MAX OF R1 AND R0
764 04AD A658 B     ST       R1,AMAX-1(R2)
765 04AE 8755 B     LD       R1,ACTR-1(R3)
766 04AF AC6B B     ST       R3,SECT
767 04B0 A45C B     ST       R1,LOCCTR
768 04B1 2CBA I     JSR      OOREC          ;OUTPUT OBJECT RECORD IF ANY
769 04B2 805C B     LD       R0,LOCCTR
770 04B3 2CBD I     JSR      OVAL
771 04B4 24D3 I     JMP      DIREND
772 04B5          ;
773 04B5 4F02 A BSECT: LI      R3,2
774 04B6 21F0 A     JMP      $1
775 04B7          ;
776 04B7 4F03 A TSECT: LI      R3,3
777 04B8 21EE A     JMP      $1
778 04B9          ;
779 04B9          ;
780 04B9          EXTD:
781 04B9 2CB6 I     JSR      IFBYP
782 04BA 4C01 A     LI       R0,1
783 04BB A069 B     ST       R0,XINOK
784 04BC 24D3 I     JMP      DIREND
785 04BD          ;
786 04BD          ;      PUT MAX OF R0 AND R1 IN R1
787 04BD          ;
788 04BD A109 A MAXR1: ST       R0,$TMP
789 04BE 3482 A     RXOR     R1,R0
790 04BF 1204 A     BOC      P,$SAME
791 04C0 8106 A     LD       R0,$TMP
792 04C1 1201 A     BOC      P,+.2
793 04C2 8504 A     LD       R1,$TMP
794 04C3 0200 A     RTS
795 04C4          ;      SAME SIGN
796 04C4 E502 A $SAME: SKG      R1,$TMP
797 04C5 8501 A     LD       R1,$TMP
798 04C6 0200 A     RTS
799 04C7 04C8 A $TMP:  .=.+1

800 04C8          .PAGE  'GLOBL,LOCAL,ASCII AND WORD DIRECTIVES'
801 04C8          .LOCAL
802 04C8          ;
803 04C8          ;      GLOBL,LOCAL,ASCII AND WORD DIRECTIVES
804 04C8          ;
805 04C8          GLOBL:
806 04C8 2CB6 I     JSR      IFBYP          ;IF BYPASS
807 04C9 2CD4 I     JSR      GSYM
808 04CA 210E A     JMP      $4          ;NO SYMBOL
809 04CB 8300 A $1:  LD       R0,0(R3)
810 04CC 6029 B     AND      R0,K8
811 04CD 1508 A     BOC      NZ,$3          ; ERROR-LOCAL CAN NOT BE MADE GLOBL
812 04CE          ;      SET GLOBL BIT
813 04CE 83FF A     LD       R0,-1(R3)
814 04CF 682C B     OR       R0,K4
815 04D0 A3FF A     ST       R0,-1(R3)      ;SET GLOBL BIT
816 04D1          $1A:
817 04D1 2C9B I     JSR      GCOMMA

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818 04D2 24D3 I      JMP      DIREND
819 04D3 2CD4 I      JSR      GSYM
820 04D4 24D3 I      JMP      DIREND      ;LIST EXHAUSTED
821 04D5 21F5 A      JMP      $1          ;LOOP
822 04D6             ;
823 04D6 4C12 A $3:   LI       R0,18;      USAGE ERROR      ;CONTRADICTION - GLOBL
824 04D7 2CAD I $2:   JSR      ERROR
825 04D8 21F8 A      JMP      $1A
826 04D9 4C00 A $4:   LI       R0,0;      MISSING ARG. ERROR      ; ERROR - MISS
827 04DA 21FC A      JMP      $2
828 04DB             ;
829 04DB             ;      LOCAL DIRECTIVE
830 04DB             ;
831 04DB             LOCAL:
832 04DB 2CB6 I      JSR      IFBYP      ;IF BYPASS
833 04DC 4C01 A      LI       R0,1
834 04DD C06C B      ADD      R0,LOCREG
835 04DE E03B B      SKG      R0,HEX3F
836 04DF 2103 A      JMP      $5
837 04E0 4C24 A      LI       R0,36;      TABLE OVERFLOW ERROR      ;ERROR - 63 L
838 04E1 2CAD I      JSR      ERROR
839 04E2 24D3 I      JMP      DIREND
840 04E3 A06C B $5:   ST       R0,LOCREG
841 04E4 24D3 I      JMP      DIREND
842 04E5             ;
843 04E5             ;      WORD DIRECTIVE
844 04E5             ;
845 04E5             WORD:
846 04E5 2CB6 I      JSR      IFBYP      ;IF BYPASS
847 04E6 2CBB I      JSR      EXP
848 04E7 24D5 I      JMP      ERRST
849 04E8 2CAE I $6:   JSR      OUTWRD      ;OUTPUT WORD
850 04E9 2C9B I      JSR      GCOMMA
851 04EA 24D6 I      JMP      ENDST

852 04EB 2CBB I      JSR      EXP      ;GET EXPRESSION
853 04EC 24D6 I      JMP      ENDST
854 04ED 21FA A      JMP      $6
855 04EE             ;
856 04EE             ;      ASCII DIRECTIVE
857 04EE             ;
858 04EE             ASCII:
859 04EE 2CB6 I      JSR      IFBYP
860 04EF 2CD7 I      JSR      GNSTRG      ;GET NEW STRING
861 04F0 2108 A      JMP      $10      ;ERROR - NONE
862 04F1 4D01 A $12:  LI       R1,1      ;RELOCATION=ABS
863 04F2 2CAE I      JSR      OUTWRD      ;OUTPUT WORD
864 04F3 2CD8 I      JSR      GCSTRG      ;GET CONTINUATION OF STRING
865 04F4 2101 A      JMP      $11      ;STRING END
866 04F5 21FB A      JMP      $12
867 04F6             ;      IS THERE ANOTHER STRING
868 04F6 2C9B I $11:  JSR      GCOMMA      ;GET COMMA
869 04F7 24D6 I      JMP      ENDST
870 04F8 21F5 A      JMP      ASCII      ;COMMA
871 04F9             ;      ERROR
872 04F9 4C18 A $10:  LI       R0,24;      SYNTAX ERROR
873 04FA 2CAD I      JSR      ERROR
874 04FB 24D3 I      JMP      DIREND

875 04FC             .PAGE      'PAGE SPACE AND LIST DIRECTIVES'
876 04FC             ;
877 04FC             ;      PAGE,SPACE AND LIST DIRECTIVES
878 04FC             ;
879 04FC             .LOCAL

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880 04FC 2926 A PAGE: JSR $BYP1 ;BYPASS IF PASS 1
881 04FD 2CB6 I JSR IFBYP
882 04FE 4FE2 A LI R3,-30 ;MAX. 60 CHAR. STRING
883 04FF AD37 A ST R3,$T1
884 0500 2CD7 I JSR GNSTRG ;GET NEW STRING
885 0501 210C A JMP $1 ;NO STRING
886 0502 2102 A JMP $3
887 0503 2CD8 I $2: JSR GCSTRG ;GET NXT 2 CARS OF STRING
888 0504 2105 A JMP $4 ;NONE LEFT
889 0505 $3:
890 0505 8931 A LD R2,$T1
891 0506 C931 A ADD R2,$PGBF
892 0507 A200 A ST R0,0(R2)
893 0508 792E A ISZ $T1
894 0509 21F9 A JMP $2
895 050A 892C A $4: LD R2,$T1
896 050B C92C A ADD R2,$PGBF
897 050C 4C00 A LI R0,0
898 050D A200 A ST R0,0(R2) ;SET END MSG INDICATOR
899 050E ; EJECT PAGE AND PRINT
900 050E 4F07 A $1: LI R3,7
901 050F CC71 B ADD R3,PGRL ;PAGE REMAINING LINES
902 0510 2CD9 I JSR OPGSTR ;OUTPUT PAGE STRING
903 0511 2CCF I JSR O6B
904 0512 24D3 I JMP DIREND
905 0513 ;
906 0513 290F A SPACE: JSR $BYP1 ;BYPASS IF PASS 1
907 0514 2CB6 I JSR IFBYP
908 0515 2CDA I JSR EXPP ;GET EXP POSITIVE
909 0516 3081 A NOP
910 0517 E071 B SKG R0,PGRL
911 0518 2101 A JMP .+2
912 0519 21F4 A JMP $1
913 051A 3381 A RCPY R0,R3
914 051B 5001 A CAI R0,1
915 051C C071 B ADD R0,PGRL
916 051D A071 B ST R0,PGRL
917 051E 4300 A PUSH R3
918 051F 2CAF I JSR OIBREP
919 0520 4700 A PULL R3
920 0521 2CA5 I JSR MANYNL
921 0522 24C8 I JMP NEXTST
922 0523 ;
923 0523 805D B $BYP1: LD R0,PASS
924 0524 1301 A BOC ODD, .+2
925 0525 24D3 I JMP DIREND
926 0526 0200 A RTS

927 0527 ;
928 0527 LIST:
929 0527 2CB6 I JSR IFBYP
930 0528 2CBB I JSR EXP
931 0529 4C01 A LI R0,1
932 052A E023 B SKG R0,ZERO
933 052B 4C00 A LI R0,0
934 052C 1101 A BOC Z, .+2
935 052D 4C01 A LI R0,1
936 052E 4000 A PUSH R0
937 052F 2CAF I JSR OIBREP
938 0530 4400 A PULL R0
939 0531 848F B LD R1,ERRLS ;1=NORMAL LISTING 0=ERROR LISTING
940 0532 F426 B SKNE R1,K1
941 0533 A08E B ST R0,LISTMD ;SET LISTING MODE
942 0534 1501 A BOC NZ, .+2

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943 0535 2CA8 I      JSR      NEWLIN
944 0536 24C8 I      JMP      NEXTST
945 0537              ;
946 0537 0000 A $T1:  .WORD    0
947 0538              ;
948 0538 018E A $PGBF: .WORD    PGSTRG+30
949 0539              ;
950 0539              ASMDIR:
951 0539 2CB6 I      JSR      IFBYP
952 053A 2CA7 I      JSR      PRCTRL
953 053B 24DB I      JMP      XERROR
954 053C 24D3 I      JMP      DIREND

955 053D              .PAGE    'TITLE DIRECTIVE'
956 053D              .LOCAL
957 053D              ;
958 053D              ;      TITLE DIRECTIVE
959 053D              ;
960 053D              TITLE:
961 053D 2CB6 I      JSR      IFBYP
962 053E 2C9C I      JSR      GNVC
963 053F 24DB I      JMP      XERROR
964 0540 2CB3 I      JSR      BLDNAM
965 0541 24DB I      JMP      XERROR
966 0542 805D B      LD       R0,PASS
967 0543 1523 A      BOC      NZ,$5
968 0544 4C10 A      LI       R0,16
969 0545 B0A1 I      ST       R0,TTLBUF
970 0546 807D B      LD       R0,NAM0          ;1ST 2 CHARACTERS OF NAME
971 0547 5C01 A      SHL      R0,1
972 0548 5CFF A      SHR      R0,1
973 0549 B0A2 I      ST       R0,TTLBUF+4
974 054A 807E B      LD       R0,NAM1          ;3RD AND 4TH CHARACTERS OF NAME
975 054B B0A3 I      ST       R0,TTLBUF+5
976 054C 807F B      LD       R0,NAM2          ;5TH AND 6TH CHARACTERS OF NAME
977 054D B0A4 I      ST       R0,TTLBUF+6
978 054E 8120 A      LD       R0,$PTR1
979 054F A11E A      ST       R0,$PTR
980 0550 2C9B I      JSR      GCOMMA
981 0551 210E A      JMP      $BLNK          ;NO STRING,BLANK OUT BUFFER
982 0552 2CD7 I      JSR      GNSTRG
983 0553 24DB I      JMP      XERROR
984 0554 B119 A      ST       R0,@$PTR
985 0555 7918 A $1:  ISZ      $PTR
986 0556 8117 A      LD       R0,$PTR
987 0557 F118 A      SKNE     R0,$PTRL
988 0558 2104 A      JMP      $2          ;TITLE BUFFER FULL
989 0559 2CD8 I      JSR      GCSTRG
990 055A 2105 A      JMP      $BLNK          ;END OF STRING
991 055B B112 A      ST       R0,@$PTR
992 055C 21F8 A      JMP      $1          ;LOOP FOR REST OF STRING
993 055D              ;      BUFFER FULL
994 055D 2CD8 I $2:  JSR      GCSTRG
995 055E 24D3 I $4:  JMP      DIREND
996 055F 21FD A      JMP      $2
997 0560              ;
998 0560              ;      BLANK OUT REST OF TITLE BUFFER
999 0560              $BLNK:
1000 0560 4C00 A      LI       R0,0
1001 0561 8D0C A      LD       R3,$PTR
1002 0562 A300 A $3:  ST       R0,0(R3)
1003 0563 4B01 A      AISZ     R3,1
1004 0564 FD0B A      SKNE     R3,$PTRL
1005 0565 24D3 I      JMP      DIREND

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1006 0566 21FB A      JMP      $3              ;LOOP BACK

1007 0567             ;
1008 0567 2C9B I $5:   JSR      GCOMMA
1009 0568 24D3 I      JMP      DIREND
1010 0569 2CD7 I      JSR      GNSTRG
1011 056A 24DB I      JMP      XERROR
1012 056B 2CD8 I      JSR      GCSTRG
1013 056C 24D3 I      JMP      DIREND
1014 056D 21FD A      JMP      .-2
1015 056E             ;
1016 056E 056F A $PTR: .+.1
1017 056F 01E1 A $PTR1: .WORD   TTLBUF+7
1018 0570 01EC A $PTL:  .WORD   TTLBUF+18

1019 0571             .PAGE   'PROCESS LABEL'
1020 0571             .LOCAL
1021 0571             ;
1022 0571             ;   PROCESS LABEL:
1023 0571             ;
1024 0571             LABEL:
1025 0571 885E B      LD       R2,INPTR
1026 0572 82FF A      LD       R0,-1(R2)
1027 0573 F034 B      SKNE     R0,BLANK
1028 0574 24DB I      JMP      XERROR
1029 0575 785E B      ISZ      INPTR              ;INPUT CHAR PTR
1030 0576 2947 A      JSR      PREPLB
1031 0577 24DC I      JMP      NEXTLB              ;BYPASS LBL ASSIGNMENT,GO TO NEXT LBL
1032 0578 8083 B      LD       R0,STPDEF
1033 0579 1103 A      BOC      Z,$7
1034 057A             $20:
1035 057A 4C30 A      LI       R0,48;              DUPLICATE DEF ERROR
1036 057B 2CAD I      JSR      ERROR              ;ERROR - DUPLICATE DEF
1037 057C 24DC I      JMP      NEXTLB
1038 057D 2CDD I $7:   JSR      P2P1
1039 057E 2107 A      JMP      $CK
1040 057F 805C B      LD       R0,LOCCTR
1041 0580 A3FE A      ST       R0,-2(R3)
1042 0581 806B B      LD       R0,SECT
1043 0582 C029 B      ADD      R0,K8              ;SET PDEF BIT
1044 0583 C3FF A      ADD      R0,-1(R3)
1045 0584 A3FF A      ST       R0,-1(R3)          ;SET RELOCATION
1046 0585 24DC I      JMP      NEXTLB              ;GO TO NEXT LABEL
1047 0586             ;   CHECK LOCCTR ALIGNMENT
1048 0586 83FF A $CK:  LD       R0,-1(R3)
1049 0587 C029 B      ADD      R0,K8
1050 0588 A3FF A      ST       R0,-1(R3)
1051 0589 83FE A      LD       R0,-2(R3)
1052 058A F05C B      SKNE     R0,LOCCTR
1053 058B 24DC I      JMP      NEXTLB
1054 058C 21ED A      JMP      $20              ;MISALIN
1055 058D             ;
1056 058D             ;   ASSIGN DIRECTIVE
1057 058D             ;
1058 058D             ASSIGN:
1059 058D 785E B      ISZ      INPTR              ;INPUT CHAR PTR
1060 058E 292F A      JSR      PREPLB              ;PREP LABEL
1061 058F 24D3 I      JMP      DIREND
1062 0590 AC8A B      ST       R3,LBLPT          ; SAVE LABEL PTR
1063 0591 2930 A      JSR      EXP
1064 0592 2125 A      JMP      $2              ; NO EXP - ERROR
1065 0593 8C8A B      LD       R3,LBLPT
1066 0594 83FF A      LD       R0,-1(R3)
1067 0595 6029 B      AND      R0,K8

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1068 0596 150F A      BOC      NZ,$1
1069 0597 807A B      LD        R0,EXPVAL      ;EXPRESSION VALUE
1070 0598 A3FE A      ST        R0,-2(R3)      ; SET VALUE

1071 0599 807C B      LD        R0,EXPREL      ;EXPRESSION RELOCATION MODE
1072 059A 6027 B      AND        R0,K3
1073 059B 111E A      BOC        Z,$3
1074 059C 847B B      LD        R1,EXPPD
1075 059D 5D03 A      SHL        R1,3
1076 059E 3400 A      RADD       R1,R0
1077 059F 87FF A      LD        R1,-1(R3)
1078 05A0 642E B      AND        R1,XFFF0      ;0FFF0
1079 05A1 3400 A      RADD       R1,R0
1080 05A2 A3FF A      ST        R0,-1(R3)
1081 05A3              $10:
1082 05A3 807A B      LD        R0,EXPVAL      ;EXPRESSION VALUE
1083 05A4              ;      OUTPUT VALUE AND RETURN
1084 05A4 2CBD I $5:   JSR        OVAL
1085 05A5 24D6 I      JMP        ENDST
1086 05A6              ;
1087 05A6 83FF A $1:   LD        R0,-1(R3)
1088 05A7 602C B      AND        R0,K4
1089 05A8 15FA A      BOC        NZ,$10
1090 05A9 4C30 A      LI         R0,48;      DUPLICATE DEF ERROR
1091 05AA 2CAD I      JSR        ERROR
1092 05AB 21F7 A      JMP        $10
1093 05AC              ;
1094 05AC              ;      DOT ASSIGN DIRECTIVE
1095 05AC              ;
1096 05AC              DOTASN:
1097 05AC 2CB6 I      JSR        IFBYP
1098 05AD 2914 A      JSR        EXP
1099 05AE 2109 A      JMP        $2      ;NO EXP ERROR
1100 05AF 3280 A      RXCH       R0,R2
1101 05B0 1109 A      BOC        Z,$3      ;NOT PREV DEF
1102 05B1 F46B B      SKNE       R1,SECT
1103 05B2 2101 A      JMP        .+2
1104 05B3 2108 A      JMP        $6
1105 05B4 A85C B      ST        R2,LOCCTR
1106 05B5 2CBA I      JSR        OOREC
1107 05B6 805C B      LD        R0,LOCCTR
1108 05B7 21EC A      JMP        $5
1109 05B8              ;
1110 05B8 4C00 A $2:   LI         R0,0;      MISSING ARG. ERROR      ;MISSING EXP E
1111 05B9 24DE I      JMP        XERR1
1112 05BA 4C12 A $3:   LI         R0,18;      NOT PREV DEFINED ERROR      ;NOT PREV
1113 05BB 24DE I      JMP        XERR1
1114 05BC 4C12 A $6:   LI         R0,18;      USAGE ERROR
1115 05BD 24DE I      JMP        XERR1
1116 05BE              ;
1117 05BE              ;      PREPARE LABEL FOR ASSIGNMENT OF VALUE
1118 05BE              ;
1119 05BE              ;      JSR        PREPLB
1120 05BE              ;      NOT OK
1121 05BE              ;      OK -LBL READY
1122 05BE              ;

1123 05BE              PREPLB:
1124 05BE 2CB6 I      JSR        IFBYP
1125 05BF 2CDF I      JSR        STSER      ;SYMBOL TABLE SEARCH
1126 05C0 0200 A      RTS        ;OVERFLOW
1127 05C1 0201 A      RTS        1

1128 05C2              .PAGE      'EXPRESSION CALC.'
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IMPASM

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1129 05C2          .LOCAL
1130 05C2          ;
1131 05C2          ;
1132 05C2          ;
1133 05C2          ;
1134 05C2          ;
1135 05C2          ;
1136 05C2 4C00 A EXP: LI      R0,0
1137 05C3 A07A B     ST      R0,EXPVAL      ;EXPRESSION VALUE
1138 05C4 4C01 A     LI      R0,1
1139 05C5 A07C B     ST      R0,EXPREL      ;EXPRESSION RELOCATION MODE ;SET ABS
1140 05C6 A07B B     ST      R0,EXPPD      ;PREV.DEF. 1=YES ;SET PREV. DEF. YES
1141 05C7 2C9D I     JSR      GITEM
1142 05C8 2106 A     JMP      $1            ;NO ITEM, PROBABLY AN OPERATOR
1143 05C9 F42C B     SKNE     R1,K4
1144 05CA 2101 A     JMP      .+2
1145 05CB 2125 A     JMP      $PLUS
1146 05CC A07A B     ST      R0,EXPVAL
1147 05CD A47C B     ST      R1,EXPREL
1148 05CE 216D A     JMP      $FIN
1149 05CF 2C9C I $1: JSR      GNVC
1150 05D0 216F A     JMP      $EX0          ;NO EXP
1151 05D1 F050 B     SKNE     R0,CPLUS
1152 05D2 2101 A     JMP      .+2
1153 05D3 2105 A     JMP      $1A
1154 05D4 4C18 A     LI      R0,24;        ERROR SYNTAX
1155 05D5 2CAD I     JSR      ERROR
1156 05D6 21F8 A     JMP      $1
1157 05D7          $NXT:
1158 05D7 2C9C I     JSR      GNVC
1159 05D8 215D A     JMP      $EXPND        ;EXP. END
1160 05D9          ; CECK OPERATOR ELSE ERROR
1161 05D9          $1A:
1162 05D9 A116 A     ST      R0,$OP
1163 05DA F04F B     SKNE     R0,COMMA
1164 05DB 2159 A     JMP      $COM
1165 05DC F043 B     SKNE     R0,RPAREN
1166 05DD 2157 A     JMP      $COM
1167 05DE F046 B     SKNE     R0,LPAREN
1168 05DF 2155 A     JMP      $COM
1169 05E0          ;
1170 05E0 2970 A     JSR      GITEM
1171 05E1 212D A     JMP      $XERR
1172 05E2 810D A     LD      R0,$OP
1173 05E3          ;
1174 05E3 F050 B     SKNE     R0,CPLUS
1175 05E4 210C A     JMP      $PLUS
1176 05E5 F051 B     SKNE     R0,CMINUS
1177 05E6 2117 A     JMP      $MINUS
1178 05E7 F03C B     SKNE     R0,CMPLY
1179 05E8 2137 A     JMP      $MPY

1180 05E9 F035 B     SKNE     R0,CDIV
1181 05EA 213B A     JMP      $DIV
1182 05EB F053 B     SKNE     R0,CAND
1183 05EC 213F A     JMP      $AND
1184 05ED F054 B     SKNE     R0,COR
1185 05EE 2142 A     JMP      $OR
1186 05EF 2109 A     JMP      $EERR        ;EXP. ERROR
1187 05F0 05F1 A $OP: .+.+1            ;TEMP SAVE OPERATOR
1188 05F1          ;
1189 05F1          ;
1190 05F1          ; PLUS OPERATOR
1191 05F1          ;

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IMPASM

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1192 05F1 8486 B $PLUS: LD      R1,ITVAL
1193 05F2 C47A B      ADD      R1,EXPVAL      ;EXPRESSION VALUE
1194 05F3 291E A      JSR      $PMREL      ;PLUS/MINUS REL.CALC.
1195 05F4 2104 A      JMP      $EERR      ;1ST RETURN , BOTH T,B OR G RELOCATION
1196 05F5 A47C B      ST       R1,EXPREL      ;EXPRESSION RELOCATION MODE ;2ND RETURN
1197 05F6 F42C B      SKNE     R1,K4      ;EXTERNAL?
1198 05F7 2101 A      JMP      $EERR      ;YES
1199 05F8 21DE A      JMP      $NXT      ;GO TO NXT OPERATOR
1200 05F9 4C12 A $EERR: LI      R0,18;      EXP. -USAGE ERROR      ;GLOBAL SYMBOL
1201 05FA 2CAD I $15: JSR      ERROR
1202 05FB 4C00 A      LI       R0,0
1203 05FC A07C B      ST       R0,EXPREL      ;EXPRESSION RELOCATION MODE ;SET UNDEFI
1204 05FD 21D9 A      JMP      $NXT      ;CONTINUE TO NXT OPERATOR
1205 05FE ;
1206 05FE ;      MINUS OPERATOR
1207 05FE ;
1208 05FE 847A B $MINUS: LD      R1,EXPVAL      ;EXPRESSION VALUE
1209 05FF D486 B      SUB      R1,ITVAL
1210 0600 2911 A      JSR      $PMREL      ;PLUS/MINUS RL.CALC.
1211 0601 2106 A      JMP      $13      ;RET 1- BOTH T,B OR G RELOCATION
1212 0602 F087 B      SKNE     R0,ITREL      ;RET 2- LOWEST IS ABS.
1213 0603 2101 A      JMP      $14      ;      ARG2 IS ABS
1214 0604 ;      ARG 1 IS ABS,ARG2 GR THAN ABS (1)
1215 0604 21F4 A      JMP      $EERR
1216 0605 F42C B $14: SKNE     R1,K4
1217 0606 21F2 A      JMP      $EERR      ;GLOBAL USAGE ERROR
1218 0607 21CF A      JMP      $NXT      ;NEXT OPERATOR
1219 0608 ;      BOTH ARGS HAVE T,B OR G RELOCATION
1220 0608 F42C B $13: SKNE     R1,K4
1221 0609 21EF A      JMP      $EERR      ;GLOBAL ERROR
1222 060A 3482 A      RXOR     R1,R0
1223 060B 15ED A      BOC      NZ,$EERR      ;NOT SAME - ERROR
1224 060C ;      SAME - SAME REL = ABS
1225 060C 4C01 A      LI       R0,1
1226 060D A07C B      ST       R0,EXPREL      ;EXPRESSION RELOCATION MODE
1227 060E 21C8 A      JMP      $NXT      ;NEXT OPERATOR
1228 060F 4C18 A $XERR: LI      R0,24;      SYNTAX ERROR
1229 0610 2CAD I      JSR      ERROR
1230 0611 2124 A      JMP      $EXPND
1231 0612 ;

1232 0612 ;      SPECIAL SUBR. USED TO HELP WITH REL.CALC. FOR PLUS/MINUS
1233 0612 ;
1234 0612 A47A B $PMREL: ST      R1,EXPVAL      ;EXPRESSION VALUE ;STORE VALUE RESULT
1235 0613 8087 B      LD       R0,ITREL
1236 0614 847C B      LD       R1,EXPREL      ;EXPRESSION RELOCATION MODE
1237 0615 E487 B      SKG      R1,ITREL
1238 0616 3180 A      RXCH     R0,R1
1239 0617 ;      R0 LESS OR EQUAL TO R1 NOW
1240 0617 1105 A      BOC      Z,$11      ;UNDEF INHERIT
1241 0618 F426 B      SKNE     R1,K1
1242 0619 2104 A      JMP      $12      ;BOTH ABS
1243 061A F026 B      SKNE     R0,K1
1244 061B 0201 A      RTS      1      ;LOW I ABS,OTHER?
1245 061C 0200 A      RTS      ;LOW IS GR THAN ABS (1)
1246 061D ;      UNDEFINED
1247 061D A07C B $11: ST       R0,EXPREL      ;EXPRESSION RELOCATION MODE
1248 061E ;      FINISHED BUT MUST POP RET. FROM STACK, THEN GO TO NXT OPERATOR
1249 061E 4400 A $12: PULL     R0
1250 061F 21B7 A      JMP      $NXT
1251 0620 ;
1252 0620 ;
1253 0620 ;
1254 0620 2923 A $MPY: JSR      $REL

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IMPASM

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1255 0621 807A B      LD      R0,EXPVAL      ;EXPRESSION VALUE
1256 0622 8486 B      LD      R1,ITVAL
1257 0623 2C0D B      JSR      @MULT
1258 0624 A47A B $MPY1: ST      R1,EXPVAL      ;EXPRESSION VALUE
1259 0625 21B1 A      JMP      $NXT
1260 0626              ;
1261 0626 291D A $DIV: JSR      $REL
1262 0627 4C00 A      LI      R0,0
1263 0628 847A B      LD      R1,EXPVAL      ;EXPRESSION VALUE
1264 0629 8C86 B      LD      R3,ITVAL
1265 062A 2C0E B      JSR      @DIVD
1266 062B 21F8 A      JMP      $MPY1
1267 062C              ;
1268 062C              ;      AND OPERATOR
1269 062C              ;
1270 062C 2917 A $AND: JSR      $REL
1271 062D 807A B      LD      R0,EXPVAL      ;EXPRESSION VALUE
1272 062E 6086 B      AND      R0,ITVAL
1273 062F A07A B $20:  ST      R0,EXPVAL      ;EXPRESSION VALUE
1274 0630 21A6 A      JMP      $NXT
1275 0631              ;
1276 0631              ;      OR OPERATOR
1277 0631              ;
1278 0631 2912 A $OR:  JSR      $REL
1279 0632 807A B      LD      R0,EXPVAL      ;EXPRESSION VALUE
1280 0633 6886 B      OR       R0,ITVAL
1281 0634 21FA A      JMP      $20
1282 0635              ;
1283 0635              ;      EXPRESSION END

1284 0635              ;
1285 0635 7C5E B $COM:  DSZ      INPTR          ;INPUT CHAR PTR
1286 0636              $EXPND:
1287 0636              ;      DIAGNOSE IF PASS 2 AND UNDEFINED
1288 0636 2CE0 I      JSR      P1P2
1289 0637 2104 A      JMP      $FIN
1290 0638 807C B      LD      R0,EXPREL      ;EXPRESSION RELOCATION MODE
1291 0639 1502 A      BOC      NZ,$FIN
1292 063A 4C2A A      LI      R0,42;          UNDEFINED ERROR
1293 063B 2CAD I      JSR      ERROR
1294 063C 807A B $FIN: LD      R0,EXPVAL      ;EXPRESSION VALUE
1295 063D 887B B      LD      R2,EXPPD      ;PREV.DEF. 1=YES ;PREV. DEF. CODE
1296 063E 847C B      LD      R1,EXPREL      ;EXPRESSION RELOCATION MODE
1297 063F 0201 A      RTS      1
1298 0640              ;
1299 0640 807A B $EX0:  LD      R0,EXPVAL      ;EXPRESSION VALUE
1300 0641 887B B      LD      R2,EXPPD      ;PREV.DEF. 1=YES
1301 0642 847C B      LD      R1,EXPREL      ;EXPRESSION RELOCATION MODE
1302 0643 0200 A      RTS      0
1303 0644              ;
1304 0644              ;      CALC. REL. FOR AND,OR,MPY,DIV
1305 0644              ;
1306 0644 8087 B $REL:  LD      R0,ITREL
1307 0645 847C B      LD      R1,EXPREL      ;EXPRESSION RELOCATION MODE
1308 0646 E487 B      SKG      R1,ITREL
1309 0647 3180 A      RXCH     R0,R1
1310 0648 E426 B      SKG      R1,K1
1311 0649 2105 A      JMP      $30
1312 064A 4C00 A      LI      R0,0
1313 064B A07C B      ST      R0,EXPREL      ;EXPRESSION RELOCATION MODE
1314 064C A07A B      ST      R0,EXPVAL      ;EXPRESSION VALUE
1315 064D 4400 A      PULL     R0
1316 064E 21AA A      JMP      SEERR          ;REL. ERROR IN EXP.
1317 064F A07C B $30:  ST      R0,EXPREL      ;EXPRESSION RELOCATION MODE

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1318 0650 0200 A      RTS
1319 0651              .PAGE      ' GET ITEM '
1320 0651              .LOCAL
1321 0651              ;
1322 0651              ;          JSR  GITEM
1323 0651              ;          NONE (NOT AN ERROR) ITVAL=0   ITREL=1 (ABS)
1324 0651              ;          NORMAL RET
1325 0651              ;          SET ITVAL,ITREL (IF GR 4, AND WITH 3)
1326 0651              ;          . REFERS TO LOCCTR
1327 0651              ;          ALLOW UNARY OPS
1328 0651              ;
1329 0651              ;
1330 0651              ;
1331 0651 4C00 A  GITEM:  LI      R0,0
1332 0652 A086 B      ST      R0,ITVAL
1333 0653 A130 A      ST      R0,$UOP
1334 0654 4C01 A      LI      R0,1
1335 0655 A087 B      ST      R0,ITREL
1336 0656 2C9C I      JSR      GNVG
1337 0657 0200 A      RTS
1338 0658              ;
1339 0658              ;          TEST LEADING CHAR.
1340 0658              ;
1341 0658 F04A B  $TEST:  SKNE    R0,DOT
1342 0659 216C A      JMP      $DOT
1343 065A F038 B      SKNE    R0,CZERO
1344 065B 2111 A      JMP      $HEX
1345 065C F045 B      SKNE    R0,QUOTE
1346 065D 2140 A      JMP      $QUOTE
1347 065E F04F B      SKNE    R0,COMMA
1348 065F 2125 A      JMP      $100
1349 0660 F052 B      SKNE    R0,CNOT
1350 0661 2133 A      JMP      $NOT
1351 0662 F051 B      SKNE    R0,CMINUS
1352 0663 2133 A      JMP      $MINUS
1353 0664 F044 B      SKNE    R0,CHARX
1354 0665 214B A      JMP      $X
1355 0666 F04E B      SKNE    R0,DOLLAR
1356 0667 214E A      JMP      $NAME
1357 0668 E035 B      SKG     R0,HEX2F
1358 0669 2167 A      JMP      $BS0
1359 066A E036 B      SKG     R0,HEX39
1360 066B 2136 A      JMP      $DEC
1361 066C 2149 A      JMP      $NAME
1362 066D              ;
1363 066D              ;
1364 066D              ;          ZERO - HEX CONSTANT
1365 066D              ;
1366 066D 2CE1 I  $HEX:  JSR      GNCVC
1367 066E 2109 A      JMP      $RET1
1368 066F E035 B      SKG     R0,HEX2F
1369 0670 2106 A      JMP      $BSPR1
1370 0671 E036 B      SKG     R0,HEX39
1371 0672 2115 A      JMP      $1
1372 0673 E032 B      SKG     R0,HEX40
1373 0674 2102 A      JMP      $BSPR1
1374 0675 E037 B      SKG     R0,HEX46
1375 0676 2113 A      JMP      $2
1376 0677              ;          BACKSPACE
1377 0677 7C5E B  $BSPR1: DSZ      INPTR
1378 0678              ;
1379 0678              ;          RETURN VALUE AFTER PROCESSING UNARY OPS WHICH WERE SAVED

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IMPASM

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1380 0678 ;
1381 0678 8486 B $RETI: LD R1,ITVAL
1382 0679 810A A LD R0,$UOP
1383 067A 1103 A BOC Z,$NOUN ;NO UNARY
1384 067B 1305 A BOC ODD,$UM ;UNARY MINUS
1385 067C 5100 A $UNOT: CAI R1,0
1386 067D A486 B $30: ST R1,ITVAL
1387 067E 8086 B $NOUN: LD R0,ITVAL
1388 067F 8487 B LD R1,ITREL
1389 0680 0201 A RTS 1
1390 0681 5101 A $UM: CAI R1,1
1391 0682 14F9 A BOC BLEQ1,$UNOT
1392 0683 21F9 A JMP $30
1393 0684 0000 A $UOP: .WORD 0 ;UNARY OP CODE BIT 0 MIN,BIT 1 NOT
1394 0685 4C18 A $100: LI R0,24; SYNTAX ERROR
1395 0686 2CAD I JSR ERROR
1396 0687 21EF A JMP $BSPR1
1397 0688 ;
1398 0688 ; CONTINUE HEX
1399 0688 ;
1400 0688 D038 B $1: SUB R0,HEX30
1401 0689 2101 A JMP $3
1402 068A D039 B $2: SUB R0,HEX37
1403 068B 8486 B $3: LD R1,ITVAL
1404 068C 7546 A SKAZ R1,XF000
1405 068D 2104 A JMP $4
1406 068E 5D04 A SHL R1,4
1407 068F 3400 A RADD R1,R0
1408 0690 A086 B ST R0,ITVAL
1409 0691 21DB A JMP $HEX ;LOOP BACK FOR NEXT HEX DIGIT
1410 0692 4C06 A $4: LI R0,6; VALUE ERROR
1411 0693 2CAD I JSR ERROR
1412 0694 21E3 A JMP $RETI
1413 0695 ;
1414 0695 ; % - NOT
1415 0695 ;
1416 0695 4D02 A $NOT: LI R1,2
1417 0696 2101 A JMP $MIN1
1418 0697 ;
1419 0697 ; - MINUS
1420 0697 ;
1421 0697 $MINUS:
1422 0697 4D01 A LI R1,1

1423 0698 81EB A $MIN1: LD R0,$UOP
1424 0699 3482 A RXOR R1,R0
1425 069A A1E9 A ST R0,$UOP
1426 069B 2C9C I JSR GNVC
1427 069C 2131 A JMP $ERR ;ERROR - NO ITEM FOLLOWS UNARY OPERATOR
1428 069D 21BA A JMP $TEST ;TEST NEW CHAR.
1429 069E ;
1430 069E ; QUOTE - STRING CONSTANT
1431 069E 2CE2 I $QUOTE: JSR GSTCON
1432 069F 212E A JMP $ERR
1433 06A0 A086 B ST R0,ITVAL
1434 06A1 21D6 A JMP $RETI
1435 06A2 ;
1436 06A2 ; NON-ZERO DIGIT
1437 06A2 D038 B $DEC: SUB R0,HEX30
1438 06A3 ; MPY ITVAL BY 10 AND ADD DIGIT FROM R0
1439 06A3 8486 B LD R1,ITVAL
1440 06A4 5D01 A SHL R1,1
1441 06A5 A486 B ST R1,ITVAL
1442 06A6 5D02 A SHL R1,2

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1443 06A7 C486 B      ADD      R1,ITVAL
1444 06A8 3400 A      RADD     R1,R0
1445 06A9 A086 B      ST        R0,ITVAL
1446 06AA 2CE1 I      JSR      GNCVC          ;GET NEXT VALID CHAR.
1447 06AB 21CC A      JMP      $RET1          ;NO MORE
1448 06AC E035 B      SKG       R0,HEX2F
1449 06AD 21C9 A      JMP      $BSPR1          ;BACKSPACE AND RETURN 1
1450 06AE E036 B      SKG       R0,HEX39
1451 06AF 21F2 A      JMP      $DEC
1452 06B0 21C6 A      JMP      $BSPR1
1453 06B1          ;
1454 06B1          ;      X - HEX OR NAME
1455 06B1 2CE1 I $X:   JSR      GNCVC
1456 06B2 2103 A      JMP      $NAME          ;NONE - NAME IS X
1457 06B3 F045 B      SKNE     R0,QUOTE
1458 06B4 21B8 A      JMP      $HEX          ; X'
1459 06B5 7C5E B      DSZ      INPTR          ;INPUT CHAR PTR
1460 06B6          ;
1461 06B6          ;      NAME
1462 06B6 7C5E B $NAME: DSZ      INPTR          ;INPUT CHAR PTR
1463 06B7 291C A      JSR      GSYM          ;GET SYMBOL
1464 06B8 2115 A      JMP      $ERR          ;NOT A VALID NAME
1465 06B9 8082 B      LD        R0,STVAL
1466 06BA A086 B      ST        R0,ITVAL
1467 06BB 8083 B      LD        R0,STPDEF
1468 06BC 607B B      AND       R0,EXPPD          ;PREV.DEF. 1=YES
1469 06BD A07B B      ST        R0,EXPPD          ;PREV.DEF. 1=YES
1470 06BE 8300 A      LD        R0,0(R3)
1471 06BF 682C B      OR        R0,K4
1472 06C0 A300 A      ST        R0,0(R3)          ;SET USED BIT
1473 06C1 8084 B      LD        R0,STREL
1474 06C2 E02C B      SKG       R0,K4

1475 06C3 2105 A      JMP      $SYRET          ;SYMBL RETURN
1476 06C4 6027 B      AND       R0,K3
1477 06C5 2103 A      JMP      $SYRET

1478 06C6          ;
1479 06C6          ;      . USE LOCCTR
1480 06C6 845C B $DOT: LD        R1,LOCCTR
1481 06C7 806B B      LD        R0,SECT
1482 06C8 A486 B      ST        R1,ITVAL
1483 06C9 A087 B $SYRET: ST      R0,ITREL
1484 06CA F026 B      SKNE     R0,K1
1485 06CB 21AC A      JMP      $RET1          ;ABS - PROCESS UNARY OPS IF THERE WERE
1486 06CC 81B7 A      LD        R0,$UOP
1487 06CD 11B0 A      BOC       Z,$NOUN
1488 06CE          ;
1489 06CE          ;
1490 06CE 4C18 A $ERR: LI        R0,24;          SYNTAX ERROR          ; SYNTAX ERROR
1491 06CF 2CAD I      JSR      ERROR
1492 06D0 0200 A      RTS        0
1493 06D1          ;
1494 06D1 7C5E B $BS0: DSZ      INPTR          ;INPUT CHAR PTR
1495 06D2 0200 A      RTS        0
1496 06D3 F000 A XF000: .WORD    0F000

1497 06D4          .PAGE    'GET SYMBOL ,BUILD NAME/DIR'
1498 06D4          .LOCAL
1500 06D4          ;      SCANS NAME,SEARCHES SYMBOL TABLE,R0=STVAL,R1=STREL
1501 06D4          ;      R3=STPT
1502 06D4          ;
1503 06D4          ;      JSR      GSYM
1504 06D4          ;      NO SYMBOL RETURN
1505 06D4          ;      NORMAL RETURN

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IMPASM

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1506 06D4 4C00 A GSYM:  LI      R0,0
1507 06D5 2101 A      JMP      $GS2
1508 06D6          ;
1509 06D6 4C02 A GFORM:  LI      R0,2
1510 06D7 A10E A $GS2:  ST      R0,$SORF      ;SYMBOL3OR3FORM
1511 06D8 2C9C I      JSR      GNV
1512 06D9 0200 A      RTS          ;NO SYMBOL RETURN
1513 06DA 290C A      JSR      BLDNAM      ;BUILD NAME
1514 06DB 0200 A      RTS          ;NO NAME RETURN
1515 06DC 8109 A      LD      R0,$SORF
1516 06DD C080 B      ADD      R0,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME
1517 06DE A080 B      ST      R0,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME
1518 06DF 2963 A      JSR      STSER      ;SEARCH SYMBOL TABLE
1519 06E0 24E3 I      JMP      INABS-1
1520 06E1 8082 B      LD      R0,STVAL      ;VALUE
1521 06E2 8484 B      LD      R1,STREL      ;RELOCATION CODE
1522 06E3 0201 A      RTS      1
1523 06E4 4400 A $GS1:  PULL     R0
1524 06E5 24D6 I      JMP      ENDST      ;STATEMENT END
1525 06E6 06E7 A $SORF:  .=-+1
1526 06E7          ;
1527 06E7          ;      BUILD NAME OR DIRECTIVE
1528 06E7          ;
1529 06E7          ;      JSR      BLDNAM OR BLDDIR
1530 06E7          ;      NO NAME RETURN
1531 06E7          ;      NORML RETURN
1532 06E7          ;
1533 06E7          ;      ENTRY:  R0 CONTAINS 1ST CHAR
1534 06E7          ;      EXIT:   R0 CONTAINS NEXT VALID CHAR (BUT NOT SKIPPE
1535 06E7          ;      $ REPLACED WITH REGION NUM.
1536 06E7          ;      SET NAM0,NAM1,NAM2,CNAM0,CNAM1
1537 06E7          ;
1538 06E7 F04E B BLDNAM:  SKNE     R0,DOLLAR
1539 06E8 2105 A      JMP      $1          ;$ OK
1540 06E9 E032 B      SKG      R0,HEX40      ;A -1
1541 06EA 0200 A      RTS          ;NOT A VALID NAME
1542 06EB E033 B      SKG      R0,HEX5A      ;Z
1543 06EC 2108 A      JMP      $2          ;NOT A VALID NAME
1544 06ED 0200 A      RTS
1545 06EE          ;      BUILD LOCAL NAME
1546 06EE 4D08 A $1:    LI      R1,8
1547 06EF A480 B      ST      R1,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME;SET LO
1548 06F0 806C B      LD      R0,LOCREG

1549 06F1 5C08 A      SHL      R0,8
1550 06F2 3181 A      RCPY     R0,R1
1551 06F3 5D02 A      SHL      R1,2
1552 06F4 2103 A      JMP      $3

1553 06F5          ;
1554 06F5          ;      BUILD NON LOCAL NAME
1555 06F5          ;      BLDDIR:
1556 06F5 4D00 A $2:    LI      R1,0
1557 06F6 A480 B      ST      R1,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME
1558 06F7 2933 A      JSR      $GL1
1559 06F8 2929 A $3:    JSR      $GP1
1560 06F9 A07D B      ST      R0,NAM0      ;1ST 2 CHARACTERS OF NAME ;STORE 1ST
1561 06FA C480 B      ADD      R1,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME;PICK U
1562 06FB A480 B      ST      R1,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME
1563 06FC          ;
1564 06FC 2924 A      JSR      $GP
1565 06FD A07E B      ST      R0,NAM1      ;3RD AND 4TH CHARACTERS OF NAME ;STORE
1566 06FE A481 B      ST      R1,CNAM1      ;COMPRESSED 3RD AND 4TH CHARS.COMPRESSE
1567 06FF 2921 A      JSR      $GP
1568 0700 A07F B      ST      R0,NAM2      ;5TH AND 6TH CHARACTERS OF NAME ;STORE

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IMPASM

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1569 0701 F048 B      SKNE    R0,BLANKS
1570 0702 210F A      JMP     $4
1571 0703          ;      SET LONG SYMBOL FLAGS
1572 0703 8030 B      LD      R0,X8000
1573 0704 C07D B      ADD     R0,NAM0          ;1ST 2 CHARACTERS OF NAME
1574 0705 A07D B      ST      R0,NAM0          ;1ST 2 CHARACTERS OF NAME
1575 0706 4C01 A      LI      R0,1
1576 0707 C080 B      ADD     R0,CNAM0        ;1ST 2 COMPRESSED CHARS. OF NAME
1577 0708 A080 B      ST      R0,CNAM0        ;1ST 2 COMPRESSED CHARS. OF NAME
1578 0709          ;      TEST IF LOCAL LONG SYMBOL
1579 0709 4C08 A      LI      R0,8
1580 070A 7080 B      SKAZ    R0,CNAM0        ;1ST 2 COMPRESSED CHARS. OF NAME
1581 070B 2101 A      JMP     .+2
1582 070C 2105 A      JMP     $4
1583 070D          ;      YES-FORCE BLANK IN 6TH CHAR OF LOCAL SYMBOL
1584 070D 807F B      LD      R0,NAM2          ;5TH AND 6TH CHARACTERS OF NAME
1585 070E 5CF8 A      SHR     R0,8
1586 070F 5C08 A      SHL     R0,8
1587 0710 C034 B      ADD     R0,BLANK
1588 0711 A07F B      ST      R0,NAM2          ;5TH AND 6TH CHARACTERS OF NAME
1589 0712 807D B $4:  LD      R0,NAM0          ;1ST 2 CHARACTERS OF NAME ;TEST IF NA
1590 0713 F10B A      SKNE    R0,$DT          ; .
1591 0714 24DB I      JMP     XERROR
1592 0715 F10A A      SKNE    R0,$DL          ; $
1593 0716 24DB I      JMP     XERROR
1594 0717          ;      SKIP EXCESS CHARS. IN NAME IF ANY
1595 0717 291D A $4B: JSR     $GAN
1596 0718 F034 B      SKNE    R0,BLANK
1597 0719 2101 A      JMP     $4A
1598 071A 21FC A      JMP     $4B
1599 071B 2C9C I $4A: JSR     GNVC
1600 071C 0201 A      RTS     1

1601 071D 7C5E B      DSZ     INPTR          ;INPUT CHAR PTR
1602 071E 0201 A      RTS     1
1603 071F 2E20 A $DT: .WORD   ' '
1604 0720 2420 A $DL: .WORD   '$'
1605 0721          ;
1606 0721          ;      GET PAIR OF CHAR
1607 0721          ;
1608 0721 2908 A $GP: JSR     $GL
1609 0722 A105 A $GP1: ST      R0,$T0
1610 0723 A505 A      ST      R1,$T1
1611 0724 290B A      JSR     $GR
1612 0725 C102 A      ADD     R0,$T0
1613 0726 C502 A      ADD     R1,$T1
1614 0727 0200 A      RTS
1615 0728          ;
1616 0728 0000 A $T0: .WORD   0          ; TEMP0
1617 0729 0000 A $T1: .WORD   0          ; TEMP1
1618 072A          ;
1619 072A          ;      GET LEFT CHAR
1620 072A          ;
1621 072A 290A A $GL: JSR     $GAN
1622 072B 3181 A $GL1: RCPY    R0,R1
1623 072C D434 B      SUB     R1,HEX20
1624 072D 5C08 A      SHL     R0,8
1625 072E 5D0A A      SHL     R1,10
1626 072F 0200 A      RTS
1627 0730          ;
1628 0730          ;      GET RIGH CHAR
1629 0730          ;
1630 0730 2904 A $GR: JSR     $GAN
1631 0731 3181 A      RCPY    R0,R1

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IMPASM

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1632 0732 D434 B      SUB      R1,HEX20
1633 0733 5D04 A      SHL      R1,4
1634 0734 0200 A      RTS
1635 0735             ;
1636 0735             ;      GET NEXT CONSECUTIVE CHAR IF ALPHA/NUM ELSE BLANK
1637 0735             ;
1638 0735 2CE4 I $GAN: JSR      GNC              ;NEXT CHAR
1639 0736 2107 A      JMP      $11              ;NONE
1640 0737 E035 B      SKG      R0,HEX2F         ;0 -1
1641 0738 2104 A      JMP      $10              ;NOT A/N
1642 0739 E032 B      SKG      R0,HEX40
1643 073A 2105 A      JMP      $12              ;MAY BE NUMERIC
1644 073B E033 B      SKG      R0,HEX5A         ;Z
1645 073C 0200 A      RTS                      ;CHAR I A/N
1646 073D 7C5E B $10: DSZ      INPTR            ;INPUT CHAR PTR ;NOT A/N - BACKSPACE I
1647 073E 8034 B $11: LD      R0,BLANK
1648 073F 0200 A      RTS
1649 0740 E036 B $12: SKG      R0,HEX39         ;9
1650 0741 0200 A      RTS                      ;RETURN WITH A/N
1651 0742 21FA A      JMP      $10
STSER - SYMBOL TABLE SEARCH

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1652 0743             .PAGE   'STSER - SYMBOL TABLE SEARCH'
1653 0743             .LOCAL
1654 0743             ;
1655 0743             ;      SYMBOL TABLE SEARCH
1656 0743             ;
1657 0743             ;      JSR      STSER
1658 0743             ;      OVERFLOW RETURN
1659 0743             ;      NORMAL RETURN (R3 PTS. TO ENTRY)
1660 0743             ;
1661 0743             ;      WILL APPEND NEW ENTRY IF NOT FOUND
1662 0743             ;
1663 0743             STSER:
1664 0743             ;
1665 0743             ;      SET REGION A
1666 0743 8065 B      LD      R0,NEXTA
1667 0744 A062 B      ST      R0,NEXT
1668 0745 8064 B      LD      R0,TOPA
1669 0746 A061 B      ST      R0,TOP
1670 0747 8063 B      LD      R0,BASEA
1671 0748 A060 B      ST      R0,BASE
1672 0749 8152 A      LD      R0,$NXTA
1673 074A             ;
1674 074A             ;      REGION SEARCH
1675 074A             ;
1676 074A 8C61 B $RSER: LD      R3,TOP
1677 074B A152 A      ST      R0,$QNXT
1678 074C 2108 A      JMP      $4
1679 074D             ;      TOP OF LOOP
1680 074D 8300 A $1:  LD      R0,0(R3)
1681 074E 6150 A      AND      R0,XFFFB
1682 074F F080 B      SKNE     R0,CNAM0         ;1ST 2 COMPRESSED CHARS. OF NAME
1683 0750 211D A      JMP      $2              ;WORD 0 MATCH
1684 0751             ;      NO MATCH-LOOP
1685 0751 8300 A $3:  LD      R0,0(R3)
1686 0752 6027 B      AND      R0,K3
1687 0753 50FE A      CAI      R0,-2
1688 0754 3300 A      RADD     R0,R3
1689 0755 FC62 B $4:  SKNE     R3,NEXT
1690 0756 2137 A      JMP      $REND            ;REGION END
1691 0757 21F5 A      JMP      $1              ;NEXT ENTRY LOOP
1692 0758             ;      APPEND ENRY IF ROOM
1693 0758             $APEND:

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1694 0758 8080 B $APPEND: LD      R0,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME
1695 0759 6027 B      AND      R0,K3
1696 075A 50FE A      CAI      R0,-2
1697 075B C062 B      ADD      R0,NEXT
1698 075C E060 B      SKG      R0,BASE
1699 075D 212A A      JMP      $ROV      ;REGION OVERFLOW
1700 075E      ;      YES - ROOM AVAIL. - APPEND ENTRY
1701 075E A062 B      ST      R0,NEXT
1702 075F B13E A      ST      R0,$QNXT
1703 0760 4801 A      AISZ     R0,1

1704 0761 A074 B      ST      R0,FORMPT
1705 0762 8080 B      LD      R0,CNAM0      ;1ST 2 COMPRESSED CHARS. OF NAME
1706 0763 A300 A      ST      R0,0(R3)
1707 0764 8481 B      LD      R1,CNAM1      ;COMPRESSED 3RD AND 4TH CHARS.
1708 0765 A7FF A      ST      R1,-1(R3)
1709 0766 4D00 A      LI      R1,0
1710 0767 A7FE A      ST      R1,-2(R3)
1711 0768 1301 A      BOC      ODD,$6      ;LONG SYMBOL
1712 0769 2102 A      JMP      $7
1713 076A      ;      NEW ENTRY TO CONTAIN LONG SYMBOL
1714 076A 847F B $6:   LD      R1,NAM2      ;5TH AND 6TH CHARACTERS OF NAME
1715 076B A7FD A      ST      R1,-3(R3)
1716 076C AC85 B $7:   ST      R3,STPT
1717 076D 2106 A      JMP      $9      ;SET UP RESULTS AND RETURN
1718 076E      ;      WORD0 MATCH CHECK OTHERS
1719 076E 87FF A $2:   LD      R1,-1(R3)
1720 076F 642E B      AND      R1,XXXX0      ;FFF0 INCLUDES LOCAL BIT
1721 0770 F481 B      SKNE     R1,CNAM1      ;COMPRESSED 3RD AND 4TH CHARS.
1722 0771 2101 A      JMP      $2A
1723 0772 21DE A      JMP      $3      ;NO MATCH
1724 0773 1310 A $2A:  BOC      ODD,$8      ;CHECK 3RD WORD
1725 0774      ;      MATCH GOOD - SET RESULTS AND RETURN
1726 0774 8300 A $9:   LD      R0,0(R3)
1727 0775 6027 B      AND      R0,K3
1728 0776 50FF A      CAI      R0,-1
1729 0777 3C00 A      RADD     R3,R0
1730 0778 A074 B      ST      R0,FORMPT
1731 0779 83FF A      LD      R0,-1(R3)
1732 077A 5CFD A      SHR      R0,3
1733 077B 6026 B      AND      R0,K1
1734 077C A083 B      ST      R0,STPDEF
1735 077D 83FF A      LD      R0,-1(R3)
1736 077E 602A B      AND      R0,K7
1737 077F A084 B      ST      R0,STREL
1738 0780 83FE A      LD      R0,-2(R3)
1739 0781 A082 B      ST      R0,STVAL
1740 0782 AC85 B      ST      R3,STPT
1741 0783 0201 A      RTS      1
1742 0784      ;
1743 0784      ;      CHECK MATCH OF 3RD WORD
1744 0784 87FD A $8:   LD      R1,-3(R3)
1745 0785 F47F B      SKNE     R1,NAM2      ;5TH AND 6TH CHARACTERS OF NAME
1746 0786 21ED A      JMP      $9      ; MATCH
1747 0787 21C9 A      JMP      $3      ;NO MATCH - LOOP
1748 0788      ;
1749 0788      ;      REGION OVERFLOW
1750 0788      ;
1751 0788 8060 B $ROV:  LD      R0,BASE
1752 0789 F066 B      SKNE     R0,BASEB      ;IS THIS LAST REGION?
1753 078A 2101 A      JMP      $10
1754 078B 2108 A      JMP      $SETB
1755 078C      ;      YES- SYMBOL TABLE OVERFLOW

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1756 078C 4C24 A $10:  LI      R0,36;          TABLE OVERFLOW ERROR
1757 078D 24AD I      JMP      ERROR          ;ALSO RETURN TO MY CALLER
1758 078E          ;
1759 078E          ;          REGION END
1760 078E          ;
1761 078E 8060 B $REND: LD      R0,BASE
1762 078F F066 B      SKNE     R0,BASEB          ;IS THIS LAST REGION?
1763 0790 21C7 A      JMP      $APEND          ;YES
1764 0791          ;          MAYBE IN 2ND REGION UNLESS EMPTY
1765 0791 8068 B      LD      R0,NEXTB
1766 0792 F067 B      SKNE     R0,TOPB          ;IS REGION B EMPTY
1767 0793 21C4 A      JMP      $APEND          ;YES
1768 0794          ;
1769 0794          ;          SET UP REGION B
1770 0794          ;
1771 0794 8068 B $SETB: LD      R0,NEXTB
1772 0795 A062 B      ST      R0,NEXT
1773 0796 8066 B      LD      R0,BASEB
1774 0797 A060 B      ST      R0,BASE
1775 0798 8067 B      LD      R0,TOPB
1776 0799 A061 B      ST      R0,TOPB
1777 079A 8102 A      LD      R0,$NXTB
1778 079B 21AE A      JMP      $RSER          ;REGION SEARCH
1779 079C 0065 B $NXTA: .WORD    NEXTA
1780 079D 0068 B $NXTB: .WORD    NEXTB
1781 079E 079F A $QNXT: .+.1
1782 079F FFFB A XFFFB: .WORD    0FFFB

1783 07A0          .PAGE
1784 07A0          .LOCAL
1785 07A0          ;
1786 07A0          ;          DIRECTIVE / INSTRUCTION SEARCH
1787 07A0          ;
1788 07A0          ;          DISER:
1789 07A0 8D15 A      LD      R3,DITBLF
1790 07A1 847E B      LD      R1,NAM1          ;3RD AND 4TH CHARACTERS OF NAME
1791 07A2 887F B      LD      R2,NAM2          ;5TH AND 6TH CHARACTERS OF NAME
1792 07A3          ;          BEGIN LOOP
1793 07A3 807D B $2:  LD      R0,NAM0          ;1ST 2 CHARACTERS OF NAME 1ST 2 CHARA
1794 07A4 F302 A      SKNE     R0,2(R3)
1795 07A5 2101 A      JMP      .+2
1796 07A6 2107 A      JMP      $3
1797 07A7 F703 A      SKNE     R1,3(R3)
1798 07A8 2101 A      JMP      $2B
1799 07A9 2105 A      JMP      $4
1800 07AA 1201 A $2B: BOC      P,+.2
1801 07AB FB04 A      SKNE     R2,4(R3)
1802 07AC 0201 A      RTS      1          ;FOUND
1803 07AD 2101 A      JMP      $4
1804 07AE          ;          NOT FOUND YET
1805 07AE 8302 A $3:  LD      R0,2(R3)
1806 07AF 1201 A $4:  BOC      P,+.2
1807 07B0 4B01 A      AISZ     R3,1          ; 5 WORD ENTRY
1808 07B1 4B04 A      AISZ     R3,4
1809 07B2 FD02 A      SKNE     R3,DITBLL
1810 07B3 0200 A      RTS          ;NOT FOUND
1811 07B4 21EE A      JMP      $2          ;REPEAT LOOP
1812 07B5 0ED6 A DITBLL: .WORD    DITBL2
1813 07B6 0D85 A DITBLF: .WORD    DITBLB

1814 07B7          .PAGE  'GET STRING - GNSTRG,GCSTRG,GSTCON'
1815 07B7          ;
1816 07B7          ;          GET NEW STRING FIRST 2 CHARACTERS - DO NOT HAVE 1ST QUOTE
1817 07B7          ;          JSR      GNSTRG

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IMPASM

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1818 07B7      ;          NONE OR ERROR RETURN (ERROR ALREADY GENERATED)
1819 07B7      ;          2 CHARS IN REG 0 RETURN
1820 07B7      ;
1821 07B7      .LOCAL
1822 07B7      GNSTRG:
1823 07B7 2C9C I      JSR      GNVC
1824 07B8 0200 A      RTS          ;END OF STATEMNT
1825 07B9 F045 B      SKNE      R0,QUOTE
1826 07BA 2101 A      JMP      $2A
1827 07BB 2122 A      JMP      $1          ;ERROR - NOT A STRING
1828 07BC 4C00 A $2A:  LI      R0,0
1829 07BD A134 A      ST       R0,$END
1830 07BE 4C00 A $2:   LI      R0,0
1831 07BF A131 A      ST       R0,$WORD

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WILL HIT TO CHANGE A SYSTEM PACK..2 MIN..

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1832 07C0 2CE4 I $5:  JSR      GNC
1833 07C1 211C A      JMP      $1          ;ERROR - ILLEGAL STRING
1834 07C2 F045 B      SKNE      R0,QUOTE
1835 07C3 2109 A      JMP      $3          ;QUOTE
1836 07C4 852C A $7:  LD       R1,$WORD
1837 07C5 3180 A      RXCH      R0,R1
1838 07C6 1502 A      BOC       NZ,$4          ;JMP IF THIS IS 2ND CHAR
1839 07C7      ;      THIS IS 1ST CHAR
1840 07C7 A529 A      ST       R1,$WORD
1841 07C8 21F7 A      JMP      $5          ;REPEAT FOR 2ND CHAR
1842 07C9      ;      THIS IS 2ND CHAR
1843 07C9 A528 A $4:  ST       R1,$END          ;SET END INDIATOR NON ZERO-NOT STRG END
1844 07CA 5C08 A      SHL       R0,8
1845 07CB C126 A      ADD       R0,$END
1846 07CC 0201 A      RTS       1          ;2ND RETURN WITH 2 CHRS. IN R0
1847 07CD      ;      DO WE HAVE DOUBLE QUOTE OR CLOSING QUOTE
1848 07CD 2CE4 I $3:  JSR      GNC
1849 07CE 2103 A      JMP      $6          ;CLOSING QUOTE
1850 07CF F045 B      SKNE      R0,QUOTE
1851 07D0 21F3 A      JMP      $7          ;DOUBLE QUOTE
1852 07D1      ;      CLOSING QUOTE - ZERO OR ONE CHAR STRING
1853 07D1 7C5E B      DSZ       INPTR          ;INPUT CHAR PTR
1854 07D2 811E A $6:  LD       R0,$WORD
1855 07D3 5C08 A      SHL       R0,8
1856 07D4 1104 A      BOC       Z,$8
1857 07D5 C034 B      ADD       R0,BLANK
1858 07D6 4D00 A      LI       R1,0
1859 07D7 A51A A $9:  ST       R1,$END          ;SET STRING END
1860 07D8 0201 A      RTS       1
1861 07D9      ;      WAS A ZERO CHAR STRING
1862 07D9 8118 A $8:  LD       R0,$END
1863 07DA 1101 A      BOC       Z,.-2
1864 07DB 0200 A      RTS          ;STRING CONTINUATION EMPTY
1865 07DC 8048 B      LD       R0,BLANKS

1866 07DD 21F9 A      JMP      $9
1867 07DE      ;      ERROR
1868 07DE 4C18 A $1:  LI       R0,24;          SYNTAX ERROR
1869 07DF 2CAD I      JSR      ERROR
1870 07E0 0200 A $10: RTS          ;RETURN WITH NO STRING
1871 07E1      ;
1872 07E1      ;      GET CONTINUATION OF STRING (2 CHARS AT A TIME)
1873 07E1      ;      JSR      GCSTRG
1874 07E1      ;      NONE
1875 07E1      ;      2 CHARS IN REG 0
1876 07E1      ;
1877 07E1 8110 A GCSTRG: LD      R0,$END
1878 07E2 11FD A      BOC       Z,$10          ;END
1879 07E3 21DA A      JMP      $2          ;NOT END
1880 07E4      ;

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IMPASM

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1881 07E4      ;      GET STRING CONSTANT  (2 CHAR STRING) - WE HAVE 1ST QUOTE
1882 07E4      ;
1883 07E4      ;      JSR      GSTCON
1884 07E4      ;      ERROR RETURN
1885 07E4      ;      2 CHARS IN R0 RETURN
1886 07E4      ;
1887 07E4 29D7 A GSTCON: JSR      $2A
1888 07E5 0200 A      RTS                      ;ERROR ALREADY NOTED
1889 07E6 A10A A      ST       R0,$WORD
1890 07E7 810A A      LD       R0,$END
1891 07E8 1106 A      BOC      Z,$11
1892 07E9 2CE4 I      JSR      GNC
1893 07EA 2102 A      JMP      $12              ;NOTE ERROR AND RETURN TO MY CALLER
1894 07EB F045 B      SKNE     R0,QUOTE
1895 07EC 2102 A      JMP      $11              ;NOTE ERROR AND RETURN TO MY CALLER
1896 07ED 4C18 A $12:  LI       R0,24;
1897 07EE 24AD I      JMP      ERROR          SYNTAX ERROR
1898 07EF      ;      LEGAL STRING CONSTANT
1899 07EF 8101 A $11:  LD       R0,$WORD
1900 07F0 0201 A      RTS      1
1901 07F1      ;
1902 07F1      ;
1903 07F1 0000 A $WORD: .WORD    0              ;SAVES 2 CHAR RESULT
1904 07F2 0000 A $END:  .WORD    0              ;0=STRING CONTINUED
1905 07F3      ;
1906 07F3      ;
1907 07F3      ;
1908 07F3      ;

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SCAN SYMBOL TABLE - MAP, GLOBAL SYMBOLS, RESET P BITS

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1909 07F3      .PAGE    'SCAN SYMBOL TABLE - MAP, GLOBAL SYMBOLS, RESET P BITS'
1910 07F3      .LOCAL
1911 07F3      ;
1912 07F3      ;      SCAN SYMBOL TABLE: OUTPUT MAP,GLOBAL RECORDS AND RESET P BITS
1913 07F3      ;
1914 07F3      ;
1915 07F3      ;      OUTPUT GLOBALS AND RESET P BITS
1916 07F3      ;
1917 07F3 4D01 A OGLOB:  LI       R1,1
1918 07F4 2103 A      JMP      $STRT
1919 07F5      ;
1920 07F5      ;      RESET P BITS
1921 07F5      ;
1922 07F5 4D00 A RESETP: LI       R1,0
1923 07F6 2101 A      JMP      $STRT
1924 07F7      ;
1925 07F7      ;      OUTPUT MAP AND RESET P BITS
1926 07F7      ;
1927 07F7      OMAP:
1928 07F7 4D02 A      LI       R1,2
1929 07F8      .ENDIF
1930 07F8 802F B $STRT: LD       R0,XFFF7
1931 07F9 2103 A      JMP      $STR1
1932 07FA 07FB A $LAST: .=-. +1
1933 07FB      ;
1934 07FB      ;      OUTPUT MAP    NO RESET OF P BITS
1935 07FB      ;
1936 07FB      OMAPNR:
1937 07FB 4D02 A      LI       R1,2
1938 07FC 4CFF A      LI       R0,-1
1939 07FD      .ENDIF
1940 07FD A162 A $STR1: ST       R0,$FLAG
1941 07FE A562 A      ST       R1,$MG          ;MAP OR GLOBAL INDICATOR
1942 07FF 4C01 A      LI       R0,1

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IMPASM

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1943 0800 A158 A      ST      R0,$GLBN      ;GLOBAL NUMBER
1944 0801 8C64 B      LD      R3,TOPA
1945 0802 8865 B      LD      R2,NEXTA
1946 0803 2904 A      JSR     SCANST
1947 0804 8C67 B      LD      R3,TOPB
1948 0805 8868 B      LD      R2,NEXTB
1949 0806 2901 A      JSR     SCANST
1950 0807 0200 A      RTS
1951 0808              ;
1952 0808              SCANST:
1953 0808 A9F1 A      ST      R2,$LAST
1954 0809              $LOOP:
1955 0809 FDF0 A      SKNE    R3,$LAST
1956 080A 0200 A      RTS
1957 080B 8155 A      LD      R0,$MG
1958 080C 1401 A      BOC     BLEQ1,.,+2
1959 080D 2101 A      JMP     $300          ;NO MAP
1960 080E 295B A      JSR     MAPLIN

1961 080F              $300:
1962 080F              ;      FINISHED MAP, IS THIS A GLOBAL
1963 080F 83FF A      LD      R0,-1(R3)
1964 0810 5CFE A      SHR     R0,2
1965 0811 1301 A      BOC     ODD,.,+2      ;YES GLOBAL
1966 0812 212E A      JMP     $6          ;NO GLOBAL
1967 0813              ;      SHOULD WE ASSIGN GLOBAL A NUMBER
1968 0813 814C A      LD      R0,$FLAG
1969 0814 5000 A      CAI     R0,0
1970 0815 1109 A      BOC     Z,$3A          ;NO
1971 0816 83FF A      LD      R0,-1(R3)
1972 0817 6027 B      AND     R0,K3
1973 0818 1506 A      BOC     NZ,$3A          ;NO
1974 0819 8300 A      LD      R0,0(R3)
1975 081A 602C B      AND     R0,K4
1976 081B 1103 A      BOC     Z,$3A          ;GLOBAL NOT USED
1977 081C              ;      ASSIGN GLOBAL NUMBER
1978 081C 813C A      LD      R0,$GLBN
1979 081D A3FE A      ST      R0,-2(R3)
1980 081E 793A A      ISZ     $GLBN
1981 081F              ;      SHOULD WE OUTPUT GLOBALS?
1982 081F              $3A:
1983 081F 8141 A      LD      R0,$MG
1984 0820 1301 A      BOC     ODD,.,+2
1985 0821 211F A      JMP     $6          ;GLOBAL NOT REQUESTED
1986 0822 83FF A      LD      R0,-1(R3)
1987 0823 6027 B      AND     R0,K3
1988 0824 1503 A      BOC     NZ,$5
1989 0825 8300 A      LD      R0,0(R3)
1990 0826 602C B      AND     R0,K4
1991 0827 1119 A      BOC     Z,$6
1992 0828              ;
1993 0828              ;      OUTPUT GLOBAL SYMBOL IF ANY
1994 0828              ;
1995 0828              ;      GLOBAL OUT CODE HERE
1996 0828              ;      *****
1997 0828              $5:
1998 0828 8300 A      LD      R0,0(R3)
1999 0829 291F A      JSR     $CONV
2000 082A A13B A      ST      R0,GLBUF+3
2001 082B 83FF A      LD      R0,-1(R3)
2002 082C 291C A      JSR     $CONV
2003 082D A139 A      ST      R0,GLBUF+4
2004 082E 8300 A      LD      R0,0(R3)
2005 082F 87FD A      LD      R1,-3(R3)

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2006 0830 1301 A      BOC      ODD, .+2
2007 0831 8448 B      LD       R1, BLANKS
2008 0832 291D A      JSR      $CBZ
2009 0833 A134 A      ST       R0, GLBUF+5
2010 0834 83FE A      LD       R0, -2(R3)
2011 0835 A133 A      ST       R0, GLBUF+6
2012 0836 83FF A      LD       R0, -1(R3)

2013 0837 6027 B      AND      R0, K3
2014 0838 1501 A      BOC      NZ, .+2
2015 0839 4C04 A      LI       R0, 4
2016 083A D026 B      SUB      R0, K1
2017 083B 5C0E A      SHL      R0, 14
2018 083C A128 A      ST       R0, GLBUF+2
2019 083D 4300 A      PUSH     R3
2020 083E 8D23 A      LD       R3, GLBUF-1
2021 083F 2CC6 I      JSR      CKPNCH
2022 0840 4700 A      PULL     R3
2023 0841          ;
2024 0841          ;      BOTTOM OF LOOP
2025 0841          ;
2026 0841 83FF A $6:   LD       R0, -1(R3)
2027 0842 611D A      AND      R0, $FLAG
2028 0843 A3FF A      ST       R0, -1(R3)      ; RESET P BIT
2029 0844 8300 A      LD       R0, 0(R3)
2030 0845 6027 B      AND      R0, K3
2031 0846 50FE A      CAI      R0, -2
2032 0847 3300 A      RADD     R0, R3      ; UPDATE TABLE PTR.
2033 0848 21C0 A      JMP      $LOOP
2034 0849          ;
2035 0849          ;      CONVERT 6 BIT NAME IN R0 TO 8 BIT NAME
2036 0849          ;
2037 0849 5CFC A $CONV: SHR      R0, 4
2038 084A 3181 A      RCPY     R0, R1
2039 084B 603B B      AND      R0, HEX3F
2040 084C 5DFA A      SHR      R1, 6
2041 084D 5D08 A      SHL      R1, 8
2042 084E 3100 A      RADD     R0, R1
2043 084F C508 A      ADD      R1, X2020
2044 0850          ;
2045 0850          ;      CONVERT BLANKS TO ZERO
2046 0850          ;
2047 0850 4C00 A $CBZ: LI       R0, 0
2048 0851 F448 B      SKNE     R1, BLANKS
2049 0852 0200 A      RTS
2050 0853 3481 A      RCPY     R1, R0
2051 0854 6424 B      AND      R1, K255
2052 0855 F434 B      SKNE     R1, BLANK
2053 0856 6042 B      AND      R0, XFF00
2054 0857 0200 A      RTS
2055 0858          ;
2056 0858 2020 A X2020: .WORD    02020
2057 0859 0000 A $GLBN: .WORD    0      ; GLOBAL NUMBER
2058 085A 085B A $NEXT: .+.1
2059 085B 085C A $PT:   .+.1
2060 085C 085D A $CT:   .+.1
2061 085D 464F A $FO:   .WORD    'FO'
2062 085E 524D A $RM:   .WORD    'RM'
2063 085F 0A7A A $RTB:  .WORD    RELTB+1
2064 0860 0861 A $FLAG: .+.1      ; FFFF IF MAP DIRECTIVE ELSE FFF7

2065 0861 0862 A $MG:   .+.1      ; MAP/GLOB INDICATOR 0=NONE 1=GLOBAL 2=MAP
2066 0862 0863 A      .WORD    .+1
2067 0863 4005 A GLBUF: .WORD    04005

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2068 0864 086A A      . = .+6
2069 086A             ;
2070 086A             ;      PRINT 1 MAP LINE
2071 086A             ;
2072 086A             ;      MAPLIN:
2073 086A ADEF A      ST      R3,$NEXT
2074 086B 7C71 B      DSZ     PGRL
2075 086C 2102 A      JMP     .+3
2076 086D 4F07 A      LI      R3,7
2077 086E 2CD9 I      JSR     OPGSTR      ;OUTPUT PAGE STRING
2078 086F 2CA8 I      JSR     NEWLIN
2079 0870             ;      NEW ENTRY
2080 0870 8DE9 A      LD      R3,$NEXT
2081 0871 8300 A      LD      R0,0(R3)
2082 0872 6029 B      AND     R0,K8
2083 0873 1103 A      BOC     Z,$NLCL      ;NON LOCAL
2084 0874             ;      LOCAL SYMBOL
2085 0874 4C24 A      LI      R0,'$'/256
2086 0875 2CE5 I      JSR     O1CH      ;OUT $ (1ST CHAR)
2087 0876 2104 A      JMP     $1      ; GO TO 2ND CHAR
2088 0877             ;      NON LOCAL
2089 0877             $NLCL:
2090 0877 8300 A      LD      R0,0(R3)
2091 0878 5CF6 A      SHR     R0,10
2092 0879 C034 B      ADD     R0,HEX20
2093 087A 2CE5 I      JSR     O1CH      ;OUT 1ST CHAR
2094 087B 8300 A $1:  LD      R0,0(R3)
2095 087C 5CFC A      SHR     R0,4
2096 087D 603B B      AND     R0,HEX3F
2097 087E C034 B      ADD     R0,HEX20
2098 087F 2CE5 I      JSR     O1CH      ;OUT 2ND CHAR
2099 0880 83FF A      LD      R0,-1(R3)
2100 0881 5CF6 A      SHR     R0,10
2101 0882 C034 B      ADD     R0,HEX20
2102 0883 2CE5 I      JSR     O1CH      ;OUT 3RD CHAR
2103 0884 83FF A      LD      R0,-1(R3)
2104 0885 5CFC A      SHR     R0,4
2105 0886 603B B      AND     R0,HEX3F
2106 0887 C034 B      ADD     R0,HEX20
2107 0888 2CE5 I      JSR     O1CH      ;OUT 4TH CHAR
2108 0889             ;      DO WE HAVE A LONG SYMBOL
2109 0889 8300 A      LD      R0,0(R3)
2110 088A 1302 A      BOC     ODD,$LONG
2111 088B             ;      SHORT SYMBOL
2112 088B 2CE6 I      JSR     O2B      ;OUTPUT 2 BLANKS
2113 088C 2102 A      JMP     $2
2114 088D             ;      LONG SYMBOL
2115 088D 83FD A $LONG: LD      R0,-3(R3)
2116 088E 2CC9 I      JSR     O2CH

2117 088F             ;
2118 088F             ;      OUTPUT VALUE
2119 088F 2CE6 I $2:  JSR     O2B
2120 0890 8300 A      LD      R0,0(R3)
2121 0891 1401 A      BOC     BLEQ1,$2A
2122 0892 2105 A      JMP     $2B
2123 0893             ;      FORM ENTRY
2124 0893 81C9 A $2A:  LD      R0,$FO      ;OUTPUT 'FORM'
2125 0894 2CC9 I      JSR     O2CH
2126 0895 81C8 A      LD      R0,$RM
2127 0896 2CC9 I      JSR     O2CH
2128 0897 2109 A      JMP     $7
2129 0898             $2B:
2130 0898 83FE A      LD      R0,-2(R3)

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2131 0899 2CCD I      JSR      OHEX
2132 089A 2CE7 I      JSR      O1B
2133 089B 83FF A      LD       R0,-1(R3)
2134 089C 602A B      AND      R0,K7
2135 089D 3281 A      RCPY     R0,R2
2136 089E C9C0 A      ADD      R2,$RTB
2137 089F 8200 A      LD       R0,0(R2)
2138 08A0 2CC9 I      JSR      O2CH          ;OUTPUT REL KEY
2139 08A1          ;
2140 08A1 4C2A A $7:   LI       R0,'*/256
2141 08A2 8700 A      LD       R1,0(R3)
2142 08A3 742C B      SKAZ     R1,K4
2143 08A4 4C20 A      LI       R0,'*/256
2144 08A5 2CE5 I      JSR      O1CH
2145 08A6          ;      FINISHED SPECIAL DEBUG CODE
2146 08A6          ;
2147 08A6 0200 A $3:   RTS

2148 08A7          .PAGE    'INSTRUCTION CLASS PROCESSING'
2149 08A7          .LOCAL
2150 08A7          ;
2151 08A7          ;      LD,ST          REG,@ADR(X)
2152 08A7          ;      ----
2153 08A7 2CE8 I IC1:  JSR      EXPP2
2154 08A8 2CE9 I      JSR      INERR
2155 08A9 5C0A A      SHL      R0,10
2156 08AA C072 B      ADD      R0,IVAL
2157 08AB A072 B      ST       R0,IVAL
2158 08AC 2C9B I      JSR      GCOMMA
2159 08AD 214A A      JMP      $80
2160 08AE 2C9C I      JSR      GNVC
2161 08AF 2103 A      JMP      $11
2162 08B0 F032 B      SKNE     R0,CAT
2163 08B1 2104 A      JMP      $12
2164 08B2 7C5E B      DSZ      INPTR          ;INPUT CHAR PTR
2165 08B3 803E B $11:  LD       R0,X1000
2166 08B4 2CEA I      JSR      GADRIX          ;GET ADR ,ALLOW INDIRECT, ALLOW INDEX
2167 08B5 210D A      JMP      $41
2168 08B6 8072 B $12:  LD       R0,IVAL
2169 08B7 C03E B      ADD      R0,X1000          ;SET INDIRECT
2170 08B8 A072 B      ST       R0,IVAL
2171 08B9 2CEB I      JSR      GADRX
2172 08BA 2108 A      JMP      $41
2173 08BB          ;
2174 08BB          ;      ADD,SUB,SKG,SKNE    REG,ADR(X)
2175 08BB          ;      -----
2176 08BB 2CE8 I IC2:  JSR      EXPP2
2177 08BC 2CE9 I      JSR      INERR
2178 08BD 5C0A A      SHL      R0,10
2179 08BE C072 B $21:  ADD      R0,IVAL
2180 08BF A072 B      ST       R0,IVAL
2181 08C0 2C9B I      JSR      GCOMMA
2182 08C1 2136 A      JMP      $80
2183 08C2          ;
2184 08C2          ;      ISZ,DSZ          ADR(X)
2185 08C2          ;
2186 08C2 2CEB I IC4:  JSR      GADRX          ;GET ADR,X OK, NO INDIRECT ALLOWED
2187 08C3 8072 B $41:  LD       R0,IVAL
2188 08C4 855F A      LD       R1,IREL          ;INSTRUCTION RELOCATION MODE
2189 08C5 24EC I      JMP      INOUT
2190 08C6          ;
2191 08C6          ;      AND,OR,SKAZ        REG0/1,ADR(X)
2192 08C6          ;      -----
2193 08C6 2CED I IC3:  JSR      EXPP1

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2194	08C7	2CE9	I		JSR	INERR	
2195	08C8	5C0A	A		SHL	R0,10	
2196	08C9	21F4	A		JMP	\$21	
2197	08CA			;			
2198	08CA			;	NOP,PULLF,PUSHF,HALT		NO ARG
2199	08CA			;			
2200	08CA	8072	B	IC5:	LD	R0,IVAL	
2201	08CB	24EE	I		JMP	INABS	; INSTR. ABS
2202	08CC			;			
2203	08CC			;	ISCAN		NO ARG
2204	08CC			;			
2205	08CC	15FD	A	IC5A:	BOC	NZ,IC5	; EXT'D OK
2206	08CD	2CEF	I		JSR	QERROR	
2207	08CE	21FB	A		JMP	IC5	
2208	08CF			;			
2209	08CF			;	PUSH,PULL,XCHRS		REG
2210	08CF			;			---
2211	08CF	2CE8	I	IC6:	JSR	EXPP2	
2212	08D0	2CE9	I		JSR	INERR	; INSTR ERROR
2213	08D1	5C08	A		SHL	R0,8	
2214	08D2	C072	B		ADD	R0,IVAL	
2215	08D3	24EE	I		JMP	INABS	
2216	08D4			;			
2217	08D4			;	AISZ,LI,CAI,ROL,SHL		REG,IMMED 8 BIT
2218	08D4			;			-----
2219	08D4	2CE8	I	IC7:	JSR	EXPP2	
2220	08D5	2CE9	I		JSR	INERR	
2221	08D6	5C08	A		SHL	R0,8	
2222	08D7	C072	B		ADD	R0,IVAL	
2223	08D8	A072	B		ST	R0,IVAL	
2224	08D9	2C9B	I		JSR	GCOMMA	
2225	08DA	211D	A		JMP	\$80	
2226	08DB	2CF0	I		JSR	EXP8	
2227	08DC	2CE9	I		JSR	INERR	
2228	08DD	C072	B		ADD	R0,IVAL	
2229	08DE	24EE	I		JMP	INABS	
2230	08DF			;			
2231	08DF			;	ROR,SHR		REG,IMMED 8 BIT
2232	08DF			;			-----
2233	08DF	2CE8	I	IC7A:	JSR	EXPP2	
2234	08E0	2CE9	I		JSR	INERR	
2235	08E1	5C08	A		SHL	R0,8	
2236	08E2	C072	B		ADD	R0,IVAL	
2237	08E3	A072	B		ST	R0,IVAL	
2238	08E4	2C9B	I		JSR	GCOMMA	
2239	08E5	2112	A		JMP	\$80	
2240	08E6	2CF0	I		JSR	EXP8	
2241	08E7	2CE9	I		JSR	INERR	
2242	08E8	5001	A		CAI	R0,1	
2243	08E9	6024	B		AND	R0,K255	
2244	08EA	C072	B		ADD	R0,IVAL	
2245	08EB	24EE	I		JMP	INABS	
2246	08EC			;			
2247	08EC			;	RADD,RXCH,RCPY,RXOR,RAND		REG,REG
2248	08EC			;			-----
2249	08EC	2CE8	I	IC8:	JSR	EXPP2	
2250	08ED	2CE9	I		JSR	INERR	
2251	08EE	5C0A	A		SHL	R0,10	
2252	08EF	C072	B		ADD	R0,IVAL	
2253	08F0	A072	B		ST	R0,IVAL	
2254	08F1	2C9B	I		JSR	GCOMMA	
2255	08F2	2105	A		JMP	\$80	

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2256 08F3 2CE8 I      JSR      EXPP2
2257 08F4 297B A      JSR      INERR
2258 08F5 5C08 A      SHL      R0,8
2259 08F6 C072 B      ADD      R0,IVAL
2260 08F7 24EE I      JMP      INABS
2261 08F8          ;
2262 08F8 2CF1 I $80:   JSR      MERROR
2263 08F9 8072 B      LD       R0,IVAL
2264 08FA 24EE I      JMP      INABS
2265 08FB          ;
2266 08FB          ;      JMP,JSR      @ADR(X)
2267 08FB          ;      ---
2268 08FB 2C9C I IC9:   JSR      GNVG
2269 08FC 2103 A      JMP      $91      ;NONE
2270 08FD F032 B      SKNE     R0,CAT
2271 08FE 2104 A      JMP      $92
2272 08FF 7C5E B      DSZ      INPTR      ;INPUT CHAR PTR
2273 0900 803D B $91:   LD       R0,HEX400
2274 0901 2CEA I      JSR      GADRIX
2275 0902 21C0 A      JMP      $41
2276 0903 8072 B $92:   LD       R0,IVAL
2277 0904 C03D B      ADD      R0,HEX400
2278 0905 A072 B      ST       R0,IVAL
2279 0906 297B A      JSR      GADRX
2280 0907 21BB A      JMP      $41
2281 0908          ;
2282 0908          ;      SFLG,PFLG      POS3,POS7
2283 0908          ;      ----
2284 0908 2CF2 I IC10:  JSR      EXPP3
2285 0909 2966 A      JSR      INERR
2286 090A 5C08 A      SHL      R0,8
2287 090B C072 B      ADD      R0,IVAL
2288 090C A072 B      ST       R0,IVAL
2289 090D 2C9B I      JSR      GCOMMA
2290 090E 24EE I      JMP      INABS
2291 090F 2CF3 I      JSR      EXPP7
2292 0910 3081 A      NOP
2293 0911 C072 B      ADD      R0,IVAL
2294 0912 24EE I      JMP      INABS
2295 0913          ;
2296 0913          ;      BOC      POS4,SPADR
2297 0913          ;      -----
2298 0913 2CF4 I IC11:  JSR      EXPP4
2299 0914 295B A      JSR      INERR
2300 0915 5C08 A      SHL      R0,8
2301 0916 C072 B      ADD      R0,IVAL
2302 0917 A072 B      ST       R0,IVAL
2303 0918 2C9B I      JSR      GCOMMA

2304 0919 295F A      JSR      MERROR
2305 091A 2CBB I      JSR      EXP
2306 091B 2954 A      JSR      INERR
2307 091C 2CF5 I      JSR      SPADR
2308 091D 2103 A      JMP      $111      ;NOT VALID SOECIAL ADR
2309 091E D03F B      SUB      R0,K256
2310 091F A072 B      ST       R0,IVAL
2311 0920 24EE I      JMP      INABS
2312 0921 2955 A $111:  JSR      ADRERR
2313 0922 8072 B      LD       R0,IVAL
2314 0923 24EE I      JMP      INABS
2315 0924 0925 A IREL:  .=.+1      ;INSTRUCTION RELOCATION MODE
2316 0925          ;
2317 0925          ;      RTS,RTI,RIN,ROUT      POS7
2318 0925          ;

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2319 0925 2CF3 I IC12: JSR      EXPP7
2320 0926 3081 A      NOP
2321 0927 C072 B      ADD      R0,IVAL
2322 0928 24EE I      JMP      INABS
2323 0929          ;
2324 0929          ;      JSRP                      POS7
2325 0929          ;      ----
2326 0929 1501 A IC12A: BOC      NZ,+.2
2327 092A 2945 A      JSR      INERR
2328 092B 2CF3 I      JSR      EXPP7
2329 092C 294C A      JSR      MERROR
2330 092D C072 B      ADD      R0,IVAL
2331 092E 24EE I      JMP      INABS
2332 092F          ;
2333 092F          ;      JINT,SETST,CLRST,SETBIT,CLRBIT,CMPBIT,JMPP
2334 092F          ;      POS4
2335 092F          ;      ----
2336 092F 1501 A IC13A: BOC      NZ,IC13          ;EXTD OK
2337 0930 2944 A      JSR      QERROR
2338 0931          ;
2339 0931 2CF4 I IC13: JSR      EXPP4
2340 0932 293D A      JSR      INERR
2341 0933 C072 B      ADD      R0,IVAL
2342 0934 24EE I      JMP      INABS
2343 0935          ;
2344 0935          ;      MPY,DIV,DADD,DSUB          ADR(X)
2345 0935          ;      ---
2346 0935 291A A IC14: JSR      DBWIN
2347 0936 24EC I      JMP      INOUT
2348 0937          ;
2349 0937          ;      LDB,STB,LLB,SLB          ADR(X)
2350 0937          ;      ---
2351 0937 2918 A IC15: JSR      DBWIN
2352 0938 5C01 A      SHL      R0,1
2353 0939 2103 A      JMP      IC16A
2354 093A          ;
2355 093A          ;      LRB,SRB          ADR(X)
2356 093A          ;      ---
2357 093A 2915 A IC16: JSR      DBWIN
2358 093B 5C01 A      SHL      R0,1
2359 093C C026 B      ADD      R0,K1
2360 093D F426 B IC16A: SKNE    R1,K1
2361 093E 24EC I      JMP      INOUT
2362 093F 2937 A      JSR      ADRERR
2363 0940 24EC I      JMP      INOUT
2364 0941          ;
2365 0941          ;      JSRI                      ADR      SPECIAL VALUE
2366 0941          ;      ---
2367 0941 2CBB I IC17: JSR      EXP
2368 0942 292D A      JSR      INERR
2369 0943 F426 B      SKNE    R1,K1
2370 0944 2103 A      JMP      .+4
2371 0945 2931 A      JSR      ADRERR
2372 0946 8072 B      LD      R0,IVAL
2373 0947 24EE I      JMP      INABS
2374 0948 683A B      OR      R0,HEX7F
2375 0949 5000 A      CAI      R0,0
2376 094A 15FA A      BOC      NZ,.-5
2377 094B 807A B      LD      R0,EXPVAL          ;EXPRESSION VALUE
2378 094C 5C09 A      SHL      R0,9
2379 094D 5CF7 A      SHR      R0,9
2380 094E C072 B      ADD      R0,IVAL
2381 094F 24EE I      JMP      INABS

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2382 0950      ;
2383 0950      ;      DOUBLE WORD INSTRUCTION SUBROUTINE
2384 0950      ;
2385 0950      DBWIN:
2386 0950 1501 A      BOC      NZ, .+2
2387 0951 2923 A      JSR      QERROR
2388 0952 2CBB I      JSR      EXP
2389 0953 2925 A      JSR      MERROR
2390 0954 A119 A      ST       R0, $VAL
2391 0955 A519 A      ST       R1, $REL
2392 0956 2C9C I      JSR      GNVC
2393 0957 2110 A      JMP      $NOX      ;NO INDEXING
2394 0958 F046 B      SKNE     R0, LPAREN
2395 0959 2102 A      JMP      .+3
2396 095A 7C5E B      DSZ      INPTR      ;INPUT CHAR PTR
2397 095B 210C A      JMP      $NOX      ;NO INDEXING
2398 095C      ;      INDEXING USED
2399 095C 2CE8 I      JSR      EXPP2
2400 095D 291B A      JSR      MERROR
2401 095E E026 B      SKG      R0, K1
2402 095F 291B A      JSR      VERROR
2403 0960 5C08 A      SHL      R0, 8
2404 0961 C072 B      ADD      R0, IVAL
2405 0962 A072 B      ST       R0, IVAL
2406 0963 2C9C I      JSR      GNVC
2407 0964 2918 A      JSR      $XERR

2408 0965 F043 B      SKNE     R0, RPAREN
2409 0966 2101 A      JMP      .+2
2410 0967 2915 A      JSR      $XERR
2411 0968 8072 B $NOX: LD      R0, IVAL
2412 0969 4D01 A      LI       R1, 1
2413 096A 2CAE I      JSR      OUTWRD
2414 096B 8102 A      LD       R0, $VAL
2415 096C 8502 A      LD       R1, $REL
2416 096D 0200 A      RTS
2417 096E      ;
2418 096E 096F A $VAL:  . = .+1
2419 096F 0970 A $REL:  . = .+1
2420 0970      ;
2421 0970      ;      INSTRUCTION ERROR
2422 0970      ;
2423 0970 4C00 A INERR: LI      R0, 0;      MISSING ARGUMENT ERROR
2424 0971      INERR1:
2425 0971 2CAD I      JSR      ERROR
2426 0972 807A B      LD       R0, EXPVAL      ;EXPRESSION VALUE
2427 0973 847C B      LD       R1, EXPREL      ;EXPRESSION RELOCATION MODE
2428 0974 0200 A      RTS
2429 0975      ;
2430 0975 4C36 A QERROR: LI      R0, 54;      EXTENDED INSTR. ERROR
2431 0976 24AD I      JMP      ERROR
2432 0977      ;
2433 0977 4C0C A ADRERR: LI      R0, 12;      ADDRESS ERROR
2434 0978 21F8 A      JMP      INERR1
2435 0979      ;
2436 0979 4C00 A MERROR: LI      R0, 0;      MISSING ARG. ERROR
2437 097A 21F6 A      JMP      INERR1
2438 097B      ;
2439 097B 4C06 A VERROR: LI      R0, 6;      VALUE ERROR
2440 097C 21F4 A      JMP      INERR1
2441 097D      ;
2442 097D 4C18 A $XERR: LI      R0, 24;      SYNTAX ERROR
2443 097E 21F2 A      JMP      INERR1

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2444 097F          .PAGE      'ADDRESS ROUTINES'
2445 097F          .LOCAL
2446 097F 4C00 A GADR:  LI      R0,0          ;NO INDIRECT PERMITTED
2447 0980 4D00 A GADRI: LI      R1,0          ;NO INDEXING PERMITTED
2448 0981 2102 A      JMP      $ADR
2449 0982          ;
2450 0982          ;
2451 0982 4C00 A GADRX: LI      R0,0          ;NO INDIRECT PERMITTED
2452 0983 4D01 A GADRIX: LI      R1,1          ;INDEXING PERMITTED
2453 0984          ;
2454 0984 A17C A $ADR:  ST      R0,$IFLAG
2455 0985 A57C A      ST      R1,$XFLAG
2456 0986 2CBB I      JSR      EXP
2457 0987 214B A      JMP      $MERR
2458 0988 847C B      LD      R1,EXPREL      ;SAVE RELOC MODE FOR DISPLACEMENT
2459 0989 A59A A      ST      R1,IREL
2460 098A 2CE0 I      JSR      P1P2
2461 098B 0200 A      RTS
2462 098C          ;      PASS 2
2463 098C 807C B      LD      R0,EXPREL      ;EXPRESSION RELOCATION MODE
2464 098D 1503 A      BOC      NZ,$DEF
2465 098E          ;      UNDEFINED
2466 098E 4C2A A      LI      R0,42;          UNDEFINED ERROR          ;UNDEFINED ARG. E
2467 098F 2CAD I      JSR      ERROR
2468 0990 0200 A      RTS
2469 0991          ;
2470 0991 F026 B $DEF:  SKNE     R0,K1
2471 0992 2107 A      JMP      $ABS
2472 0993 F040 B      SKNE     R0,K2
2473 0994 2166 A      JMP      $BSECT
2474 0995 F027 B      SKNE     R0,K3
2475 0996 2134 A      JMP      $TSECT
2476 0997 F02C B      SKNE     R0,K4
2477 0998 2162 A      JMP      $EXT
2478 0999 0000 A      HALT
2479 099A          ;
2480 099A          ;
2481 099A 2C9C I $ABS:  JSR      GNVC
2482 099B 2103 A      JMP      .+4
2483 099C 7C5E B      DSZ      INPTR
2484 099D F046 B      SKNE     R0,LPAREN
2485 099E 2106 A      JMP      $ABS1
2486 099F 807A B      LD      R0,EXPVAL
2487 09A0 1201 A      BOC      P, .+2
2488 09A1 2108 A      JMP      $2
2489 09A2 E024 B      SKG      R0,K255
2490 09A3 210A A      JMP      $3
2491 09A4 2105 A      JMP      $2
2492 09A5 807A B $ABS1: LD      R0,EXPVAL      ;EXPRESSION VALUE
2493 09A6 E15E A      SKG      R0,KM129
2494 09A7 2102 A      JMP      $2
2495 09A8 E03A B      SKG      R0,HEX7F

2496 09A9 2104 A      JMP      $3
2497 09AA 295B A $2:   JSR      SPADR          ;SECIAL ADR-RELATIVE TO PC OK?
2498 09AB 2122 A      JMP      $TRYI          ;NO - TRY INDIRECT
2499 09AC 0200 A      RTS                      ;YES
2500 09AD          ;      ADDRESS OK
2501 09AD 807A B $ADROK: LD      R0,EXPVAL      ;EXPRESSION VALUE
2502 09AE 6024 B $3:  AND      R0,K255
2503 09AF C072 B      ADD      R0,IVAL
2504 09B0 A072 B      ST      R0,IVAL
2505 09B1 8150 A      LD      R0,$XFLAG
2506 09B2 1501 A      BOC      NZ,$XOK          ;INDEXING OK

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2507 09B3 0200 A      RTS
2508 09B4              ; INDEXING OK
2509 09B4 2C9C I $XOK: JSR      GNVC
2510 09B5 0200 A      RTS
2511 09B6 F046 B      SKNE     R0,LPAREN
2512 09B7 2102 A      JMP      $LP
2513 09B8 7C5E B      DSZ      INPTR      ;INPUT CHAR PTR
2514 09B9 0200 A      RTS
2515 09BA              ;
2516 09BA              ; LEFT PAREN
2517 09BA 2971 A $LP:  JSR      EXPP2
2518 09BB 2109 A      JMP      $VERR      ;INDEX VALUE ERROR
2519 09BC 1401 A      BOC      B1EQ1,..+2
2520 09BD 2107 A      JMP      $VERR
2521 09BE 5C08 A      SHL      R0,8
2522 09BF C072 B      ADD      R0,IVAL      ;SET INDEX FIELD
2523 09C0 A072 B      ST       R0,IVAL
2524 09C1 2C9C I      JSR      GNVC
2525 09C2 2102 A      JMP      $VERR
2526 09C3 F043 B      SKNE     R0,RPAREN
2527 09C4 0200 A      RTS
2528 09C5              ;
2529 09C5              ;
2530 09C5 4C06 A $VERR: LI      R0,6;      VALUE ERROR      ;VALUE ERROR
2531 09C6 2CAD I      JSR      ERROR
2532 09C7 4D01 A $ERET: LI      R1,1
2533 09C8 A47C B      ST       R1,EXPREL      ;EXPRESSION RELOCATION MODE
2534 09C9 B4F6 I      ST       R1,IREL
2535 09CA 0200 A      RTS
2536 09CB              ;
2537 09CB              ; EXP REL = TSECT
2538 09CB 806B B $TSECT: LD      R0,SECT
2539 09CC F027 B      SKNE     R0,K3      ;SECT = TSECT?
2540 09CD 21DC A      JMP      $2      ;YES
2541 09CE              ; TRY INDIRECT
2542 09CE 8132 A $TRYI: LD      R0,$IFLAG
2543 09CF 1506 A      BOC      NZ,$IOK      ;INDIRECT OK
2544 09D0              ; INDIRECT NOT OK
2545 09D0 4C0C A $AERR: LI      R0,12;      ADDRESS ERROR
2546 09D1 2CAD I      JSR      ERROR      ;ADDRESSING ERROR
2547 09D2 21F4 A      JMP      SERET      ;ERROR RETURN

2548 09D3              ;
2549 09D3 4C00 A $MERR: LI      R0,0;      MISSING ARG. ERROR
2550 09D4 2CAD I      JSR      ERROR
2551 09D5 0200 A      RTS
2552 09D6              ;
2553 09D6              ; INDIRECT OK - GENERATE INDIRECT WORD
2554 09D6              ; GENERATE POINTER
2555 09D6              ; $IOK:
2556 09D6 8072 B      LD       R0,IVAL
2557 09D7 C129 A      ADD      R0,$IFLAG
2558 09D8 A072 B      ST       R2,IVAL
2559 09D9 8145 A      LD       R0,$CI
2560 09DA B0B1 I      ST       R0,RELTB+3      ;REPLACE B WITH I IN REL TABLE
2561 09DB 2CE0 I      JSR      P1P2      ;PASS1
2562 09DC 2117 A      JMP      $IOK1
2563 09DD 8D25 A      LD       R3,PTABF
2564 09DE 847C B      LD       R1,EXPREL      ;EXPRESSION RELOCATION MODE
2565 09DF              ; TOP OF LOOP
2566 09DF 8B01 A $IOK5: LD      R2,1(R3)
2567 09E0 8300 A      LD      R0,0(R3)
2568 09E1 1108 A      BOC      Z,$IOK2      ;ADD NEW ENTRY
2569 09E2 3482 A      RXOR     R1,R0

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2570 09E3 1502 A      BOC      NZ,$IOK3      ;NEXT
2571 09E4 F87A B      SKNE      R2,EXPVAL      ;EXPRESSION VALUE
2572 09E5 2109 A      JMP      $IOK4      ;FOUND
2573 09E6      ;      NEXT3ENTRY
2574 09E6      ;      SIOK3:
2575 09E6 4B02 A      AISZ      R3,2
2576 09E7 FD1C A      SKNE      R3,PTABF
2577 09E8 210F A      JMP      $IOK6      ;TABLE3OVERFLOW
2578 09E9 21F5 A      JMP      $IOK5      ;GOTO3TOP3OF3,LOP
2579 09EA      ;      ADD3NEW3ENTRY
2580 09EA A700 A $IOK2: ST      R1,0(R3)
2581 09EB 807A B      LD      R0,EXPVAL      ;EXPRESSION VALUE
2582 09EC A301 A      ST      R0,1(R3)
2583 09ED 4C00 A      LI      R0,0
2584 09EE A302 A      ST      R0,2(R3)
2585 09EF      ;      ENTRY3FOUND
2586 09EF DD13 A $IOK4: SUB      R3,PTABF
2587 09F0 5FFF A      SHR      R3,1
2588 09F1 CC5A B      ADD      R3,BMAX
2589 09F2 CC72 B      ADD      R3,IVAL
2590 09F3 AC72 B      ST      R3,IVAL
2591 09F4      ;      RETURN
2592 09F4 4D02 A $IOK1: LI      R1,2
2593 09F5 A47C B      ST      R1,EXPREL      ;EXPRESSION RELOCATION MODE
2594 09F6 B4F6 I      ST      R1,IREL
2595 09F7 0200 A      RTS
2596 09F8      ;      TABLE3OVERFLOW
2597 09F8 4C24 A $IOK6: LI      R0,36;      ERROR TABLE OVERFLOW
2598 09F9 2CAD I      JSR      ERROR
2599 09FA 21F9 A      JMP      $IOK1      ;RETURN

2600 09FB      ;      END OF POINTER GENERATION
2601 09FB      ;
2602 09FB      ;
2603 09FB      ;      EXP REL = EXTERNAL
2604 09FB $EXT:
2605 09FB      ;
2606 09FB      ;      EXP REL = BSECT
2607 09FB 807A B $BSECT: LD      R0,EXPVAL      ;EXPRESSION VALUE
2608 09FC 1201 A      BOC      P,$10
2609 09FD 21D2 A      JMP      $AERR
2610 09FE E024 B $10:  SKG      R0,K255
2611 09FF 21AD A      JMP      $ADROK      ;OK - ADR IN RANGE 0 TO 255
2612 0A00 21CF A      JMP      $AERR
2613 0A01      ;
2614 0A01 0A02 A $IFLAG: .+.1      ;INDIRECT FLAG - 0=NOT ALLOWED
2615 0A02 0A03 A $XFLAG: .+.1      ;INDEX FLAG - 0=NOT ALLOWED
2616 0A03 0199 A PTABF: .WORD      PTRTAB
2617 0A04 01D9 A PTABL: .WORD      PTREND-1
2618 0A05 FF7F A KM129: .WORD      -129
2619 0A06      ;
2620 0A06      ;
2621 0A06      ;      SPECIAL ADR ?      JSR      SPADR
2622 0A06      ;      NO
2623 0A06      ;      YES
2624 0A06 2C9C I SPADR: JSR      GNVC
2625 0A07 2103 A      JMP      $50
2626 0A08 7C5E B      DSZ      INPTR      ;INPUT CHAR PTR
2627 0A09 F045 B      SKNE      R0,LPAREN
2628 0A0A 0200 A      RTS
2629 0A0B 806B B $50:  LD      R0,SECT
2630 0A0C F07C B      SKNE      R0,EXPREL      ;EXPRESSION RELOCATION MODE
2631 0A0D 2101 A      JMP      $51
2632 0A0E 0200 A      RTS

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2633 0A0F 807A B $51: LD R0,EXPVAL ;EXPRESSION VALUE
2634 0A10 D05C B SUB R0,LOCCTR
2635 0A11 D026 B SUB R0,K1
2636 0A12 E1F2 A SKG R0,KM129 ; -129
2637 0A13 0200 A RTS
2638 0A14 E03A B SKG R0,HEX7F
2639 0A15 2101 A JMP $52
2640 0A16 0200 A RTS
2641 0A17 6024 B $52: AND R0,K255
2642 0A18 C03F B ADD R0,K256
2643 0A19 C072 B ADD R0,IVAL
2644 0A1A A072 B ST R0,IVAL
2645 0A1B 4D01 A LI R1,1
2646 0A1C A47C B ST R1,EXPREL ;EXPRESSION RELOCATION MODE
2647 0A1D B4F6 I ST R1,IREL
2648 0A1E 0201 A RTS 1
2649 0A1F ;
2650 0A1F 2049 A $CI: .WORD ' I '

2651 0A20 .PAGE 'SPECIAL EXPRESSION REQUESTS'
2652 0A20 .LOCAL
2653 0A20 ;
2654 0A20 ;
2655 0A20 ;
2656 0A20 4C00 A EXPABS: LI R0,0
2657 0A21 $4:
2658 0A21 4D01 A LI R1,1 ;POS/NEG OK
2659 0A22 2112 A JMP $EXPN
2660 0A23 ;
2661 0A23 8030 B EXPP: LD R0,X8000
2662 0A24 4D00 A $5: LI R1,0 ;POS ONLY
2663 0A25 210F A JMP $EXPN
2664 0A26 ;
2665 0A26 802E B EXP4: LD R0,XFFF0 ;0FFF0
2666 0A27 21F9 A JMP $4
2667 0A28 ;
2668 0A28 8042 B EXP8: LD R0,XFF00
2669 0A29 21F7 A JMP $4
2670 0A2A ;
2671 0A2A 4CFE A EXPP1: LI R0,-2
2672 0A2B 21F8 A JMP $5
2673 0A2C ;
2674 0A2C 4CFC A EXPP2: LI R0,-4
2675 0A2D 21F6 A JMP $5
2676 0A2E ;
2677 0A2E 4CF8 A EXPP3: LI R0,-8
2678 0A2F 21F4 A JMP $5
2679 0A30 ;
2680 0A30 4CF0 A EXPP4: LI R0,-16
2681 0A31 21F2 A JMP $5
2682 0A32 ;
2683 0A32 4C80 A EXPP7: LI R0,-128
2684 0A33 21F0 A JMP $5
2685 0A34 ;
2686 0A34 ; EXP WITH MASK IN R0 (USED BY FORM DIRECTIVE)
2687 0A34 4D01 A EXPFRM: LI R1,1
2688 0A35 ;
2689 0A35 ; MASK IN R0, FLAG IN R1 (0=POS)
2690 0A35 ;
2691 0A35 A11E A $EXPN: ST R0,$MASK
2692 0A36 A51E A ST R1,$FLAG ;0=POS
2693 0A37 2CBB I JSR EXP
2694 0A38 0200 A RTS 0 ;NO EXP
2695 0A39 847C B LD R1,EXPREL ;EXPRESSION RELOCATION MODE

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2696 0A3A E426 B      SKG      R1,K1
2697 0A3B 2109 A      JMP      $1          ;ABS OR UNDEF
2698 0A3C              ;      ERROR - SIZE
2699 0A3C 4C06 A $2:  LI      R0,6;      VALUE ERROR
2700 0A3D 2CAD I      JSR      ERROR
2701 0A3E 4C00 A      LI      R0,0
2702 0A3F 4E01 A      LI      R2,1

2703 0A40 A07A B      ST      R0,EXPVAL    ;EXPRESSION VALUE
2704 0A41 A87B B      ST      R2,EXPPD     ;PREV.DEF. 1=YES
2705 0A42 A07C B      ST      R0,EXPREL    ;EXPRESSION RELOCATION MODE
2706 0A43 847C B      LD      R1,EXPREL    ;EXPRESSION RELOCATION MODE
2707 0A44 0201 A      RTS      1
2708 0A45              ;
2709 0A45 850E A $1:  LD      R1,$MASK
2710 0A46 3483 A      RAND     R1,R0
2711 0A47 1106 A      BOC      Z,$3          ;OK
2712 0A48 810C A      LD      R0,$FLAG
2713 0A49 11F2 A      BOC      Z,$2          ;ERROR - WE NEED POSITIVE
2714 0A4A              ;      NEGATIVE OK
2715 0A4A 807A B      LD      R0,EXPVAL    ;EXPRESSION VALUE
2716 0A4B 3483 A      RAND     R1,R0
2717 0A4C 3482 A      RXOR     R1,R0
2718 0A4D 15EE A      BOC      NZ,$2          ;ERROR
2719 0A4E              ;      VALUE OK
2720 0A4E 8105 A $3:  LD      R0,$MASK
2721 0A4F 5000 A      CAI      R0,0
2722 0A50 607A B      AND      R0,EXPVAL    ;EXPRESSION VALUE
2723 0A51 847C B      LD      R1,EXPREL    ;EXPRESSION RELOCATION MODE
2724 0A52 887B B      LD      R2,EXPPD     ;PREV.DEF. 1=YES
2725 0A53 0201 A      RTS      1
2726 0A54              ;
2727 0A54 0A55 A $MASK: .=. +1
2728 0A55 0A56 A SFLAG: .=. +1          ; 0=POS  NZ=POS/NEG

2729 0A56              .PAGE  'OUTPUT DATA WORD TO LIST AND BINARY'
2730 0A56              .LOCAL
2731 0A56              ;      JSR OUTWRD
2732 0A56 A12B A OUTWRD: ST      R0,$WRD
2733 0A57 A52B A      ST      R1,$REL
2734 0A58 805D B      LD      R0,PASS
2735 0A59 1301 A      BOC      ODD,.+2
2736 0A5A 2116 A      JMP      $3
2737 0A5B 806A B      LD      R0,MOFLAG    ;MULTIPLE OUTPUT FLAG 0=1ST  NZ=SUBSEQ
2738 0A5C 1106 A      BOC      Z,$1
2739 0A5D 7C71 B      DSZ      PGRL        ;PAGE REMAINING LINES
2740 0A5E 2102 A      JMP      .+3
2741 0A5F 4F07 A      LI      R3,7
2742 0A60 2CD9 I      JSR      OPGSTR      ;OUTPUT PAGE STRING
2743 0A61 2972 A      JSR      NEWLIN
2744 0A62 2943 A      JSR      O6B
2745 0A63 805C B $1:  LD      R0,LOCCTR
2746 0A64 2931 A      JSR      OHEX
2747 0A65 2944 A      JSR      O1B
2748 0A66 811B A      LD      R0,$WRD
2749 0A67 292E A      JSR      OHEX
2750 0A68 8D1A A      LD      R3,$REL
2751 0A69 EC2C B      SKG      R3,K4
2752 0A6A 2101 A      JMP      .+2
2753 0A6B DC2C B      SUB      R3,K4
2754 0A6C CD0C A      ADD      R3,$RELTB
2755 0A6D 8300 A      LD      R0,0(R3)
2756 0A6E 2966 A      JSR      O2CH
2757 0A6F 293A A      JSR      O1B

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2758 0A70 2CF7 I      JSR      OIBUF          ;OUTPUT INPUT BUFFER
2759 0A71 785C B $3:   ISZ      LOCCTR
2760 0A72 3081 A      NOP
2761 0A73 810E A      LD        R0,$WRD
2762 0A74 890E A      LD        R2,$REL
2763 0A75 2D02 A      JSR      @SLOWWRD      ;OUTPUT OBJECT WORD
2764 0A76 3081 A      NOP
2765 0A77 0200 A      RTS
2766 0A78 0C6F A $LOWWRD: .WORD      OOWORD
2767 0A79          ;
2768 0A79          ;
2769 0A79          RELTB:
2770 0A79 0A7A A $RELTB: .WORD      .+1
2771 0A7A 2055 A      .ASCII      ' U A B T XGAGBGT '
      0A7B 2041 A
      0A7C 2042 A
      0A7D 2054 A
      0A7E 2058 A
      0A7F 4741 A
      0A80 4742 A
      0A81 4754 A
2772 0A82 0A83 A $WRD:   .+.+1
2773 0A83 0A84 A $REL:   .+.+1

2774 0A84          ;
2775 0A84          ;      OUTPUT VALUE FROM ASSIGN OR END DIRECTIVES
2776 0A84          ;
2777 0A84 2909 A OVAL:   JSR      OHEXIF
2778 0A85 805D B      LD        R0,PASS
2779 0A86 1301 A      BOC      ODD,+.2
2780 0A87 0200 A      RTS
2781 0A88 8089 B      LD        R0,INDEV      ;INPUT DEVICE 0=CR,1=KB,2=PT
2782 0A89 13FD A      BOC      ODD,.-2
2783 0A8A 291D A      JSR      O2B
2784 0A8B 291E A      JSR      O1B
2785 0A8C 2CF7 I      JSR      OIBUF
2786 0A8D 0200 A      RTS
2787 0A8E          ;
2788 0A8E          ;      OUTPUT HEX IF PASS2 ELSE IGNORE
2789 0A8E          ;
2790 0A8E 4000 A OHEXIF: PUSH      R0
2791 0A8F 805D B      LD        R0,PASS
2792 0A90 1302 A      BOC      ODD,+.3
2793 0A91 4400 A      PULL      R0
2794 0A92 0200 A      RTS
2795 0A93 2913 A      JSR      O4B
2796 0A94 2915 A      JSR      O1B
2797 0A95 4400 A      PULL      R0
2798 0A96          ;
2799 0A96          ;      OUTPUT 4 HEX DIGITS      JSR      OHEX
2800 0A96          ;
2801 0A96 2903 A OHEX:   JSR      $01X1
2802 0A97 2901 A      JSR      $01X
2803 0A98 2900 A      JSR      $01X
2804 0A99          ;
2805 0A99 810A A $01X:   LD        R0,$TEMP
2806 0A9A 5804 A $01X1:  ROL      R0,4
2807 0A9B A108 A      ST        R0,$TEMP
2808 0A9C 602D B      AND      R0,K15
2809 0A9D E02B B      SKG      R0,K9
2810 0A9E 2103 A      JMP      $01X2
2811 0A9F C039 B      ADD      R0,HEX37
2812 0AA0 290A A $01X3: JSR      O1CH
2813 0AA1 0200 A      RTS

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2814 0AA2      ;
2815 0AA2 C038 B $01X2:  ADD    R0,HEX30
2816 0AA3 21FC A          JMP    SOLX3
2817 0AA4      ;
2818 0AA4 0AA5 A $TEMP:   .=.+1          ;TEMP
2819 0AA5 0D0A A HEXD0A: .WORD    0D0A
2820 0AA6      ;
2821 0AA6      ;          OUTPUT 6 /4 BLANKS
2822 0AA6      ;
2823 0AA6 2901 A O6B:     JSR     O2B
2824 0AA7 2900 A O4B:     JSR     O2B
2825 0AA8      ;

2826 0AA8      ;          OUTPUT 2 BLANKS,1 BLANK OR 1 CHAR
2827 0AA8      ;
2828 0AA8 4C20 A O2B:     LI      R0,' '/256          ;OUTPUT 2 BLANKS
2829 0AA9 2901 A          JSR     O1CH
2830 0AAA 4C20 A O1B:     LI      R0,' '/256          ;OUTPUT 1 BLANK
2831 0AAB      ;
2832 0AAB      ;          PUT CHAR OUT IF IN LIST MODE
2833 0AAB      ;
2834 0AAB 4000 A O1CH:    PUSH    R0
2835 0AAC 800C A          LD      R0,PNCHMD
2836 0AAD 1506 A          BOC     NZ,$PUT3
2837 0AAE 805D B          LD      R0,PASS
2838 0AAF 1306 A          BOC     ODD,$PUT2
2839 0AB0 8097 B $PUT1:   LD      R0,TYPMOD
2840 0AB1 1502 A          BOC     NZ,+.3
2841 0AB2 4400 A          PULL    R0
2842 0AB3 241A B          JMP     @HSPRT
2843 0AB4 4400 A $PUT3:   PULL    R0
2844 0AB5 2410 B          JMP     @PUTC
2845 0AB6 808E B $PUT2:   LD      R0,LISTMD
2846 0AB7 15F8 A          BOC     NZ,$PUT1
2847 0AB8 808B B          LD      R0,ERRPT
2848 0AB9 F055 B          SKNE    R0,ERRBAS
2849 0ABA 2101 A          JMP     .+2
2850 0ABB 21F4 A          JMP     $PUT1
2851 0ABC 4400 A          PULL    R0
2852 0ABD 0200 A          RTS
2853 0ABE      ;
2854 0ABE      ;
2855 0ABE 806A B O12B:    LD      R0,MOFLAG
2856 0ABF 1502 A          BOC     NZ,$RET
2857 0AC0 29E5 A          JSR     O6B
2858 0AC1 29E4 A          JSR     O6B
2859 0AC2 0200 A $RET:    RTS
2860 0AC3      ;
2861 0AC3      ;          OUTPUT N CR AND LF WHERE N IS IN R3
2862 0AC3      ;
2863 0AC3 EC3B B MANYNL:  SKG     R3,HEX3F
2864 0AC4 FC23 B          SKNE    R3,ZERO
2865 0AC5 0200 A          RTS
2866 0AC6 8096 B          LD      R0,HSPR
2867 0AC7 1508 A          BOC     NZ,$MAN1
2868 0AC8 EC71 B          SKG     R3,PGRL
2869 0AC9 2106 A          JMP     $MAN1
2870 0ACA 8091 B          LD      R0,NOLIST
2871 0ACB 1104 A          BOC     Z,$MAN1
2872 0ACC 4C0D A          LI      R0,0D
2873 0ACD 2C1A B          JSR     @HSPRT
2874 0ACE 4C0C A          LI      R0,0C
2875 0ACF 241A B          JMP     @HSPRT
2876 0AD0      $MAN1:

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2877 0AD0 2903 A      JSR      NEWLIN
2878 0AD1 4BFF A      AISZ      R3,-1
2879 0AD2 21FD A      JMP       .-2
2880 0AD3 0200 A      RTS
2881 0AD4           ;
2882 0AD4           ;      OUTPUT CR AND LF      OUTPUT 2 CHARS
2883 0AD4           ;
2884 0AD4 81D0 A NEWLIN: LD      R0,HEXD0A
2885 0AD5           ;
2886 0AD5 A1CE A O2CH:  ST      R0,$TEMP
2887 0AD6 5CF8 A      SHR      R0,8
2888 0AD7 29D3 A      JSR      O1CH
2889 0AD8 81CB A      LD      R0,$TEMP
2890 0AD9 6024 B      AND      R0,K255
2891 0ADA 21D0 A      JMP      O1CH      ;OUT CHAR AND RETURN
2892 0ADB           ;
2893 0ADB           ;      OUTPUT NEW LINE AND MESSAGE
2894 0ADB           ;      R3 POINTS TO MESSAGE      0 WORD ENDS MESSAGE
2895 0ADB           ;
2896 0ADB 29F8 A ONLMSG: JSR      NEWLIN
2897 0ADC 8300 A OMSG:  LD      R0,0(R3)
2898 0ADD 11E4 A      BOC      Z,$RET
2899 0ADE 5C01 A      SHL      R0,1
2900 0ADF 5CFF A      SHR      R0,1
2901 0AE0 29F4 A      JSR      O2CH
2902 0AE1 8300 A      LD      R0,0(R3)
2903 0AE2 1201 A      BOC      P,.-2
2904 0AE3 0200 A      RTS      ;LAST WORD NEG.
2905 0AE4 4B01 A      AISZ      R3,1
2906 0AE5 21F6 A      JMP      OMSG
2907 0AE6 0200 A      RTS
2908 0AE7           ;
2909 0AE7           ;
2910 0AE7           ;
2911 0AE7           ;      OUTPUT PAGE STRING
2912 0AE7           ;
2913 0AE7 29DB A OPGSTR: JSR      MANYNL
2914 0AE8 4C37 A      LI      R0,55
2915 0AE9 A071 B      ST      R0,PGRL
2916 0AEA ED06 A      LD      R3,SEQTTL
2917 0AEB 29EF A      JSR      ONLMSG
2918 0AEC 8D03 A      LD      R3,SEQPG      ;=PGSTRG
2919 0AED 29ED A      JSR      ONLMSG
2920 0AEE 4F02 A      LI      R3,2
2921 0AEF 21D3 A      JMP      MANYNL
2922 0AF0           ;
2923 0AF0 0170 A $EQPG: .WORD    PGSTRG
2924 0AF1 01DE A $EQTTL: .WORD    TTLBUF+4

2925 0AF2           .PAGE      'REPORT ERRORS'
2926 0AF2           .LOCAL
2927 0AF2           ;
2928 0AF2           ;      CHECK EXCESS ARGUMENTS
2929 0AF2           ;
2930 0AF2           XARGCK:
2931 0AF2 2C9C I      JSR      GNVC
2932 0AF3 0200 A      RTS
2933 0AF4 808B B      LD      R0,ERRPT
2934 0AF5 D055 B      SUB      R0,ERRBAS
2935 0AF6 1502 A      BOC      NZ,.-3
2936 0AF7 4C1E A      LI      R0,30;      EXCESS ARGUMENTS ERROR
2937 0AF8 2CAD I      JSR      ERROR
2938 0AF9 0200 A      RTS

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2939 0AFA 0C35 A PR2PTR: .WORD  PRMPT2
2940 0AFB      ;
2941 0AFB      ;      OUTPUT INPUT BUFFER AND REPORT ERRORS
2942 0AFB      ;
2943 0AFB      OIBREP:
2944 0AFB 8096 B      LD      R0,HSPR
2945 0AFC A097 B      ST      R0,TYPMOD
2946 0AFD 805D B      LD      R0,PASS
2947 0AFE 1301 A      BOC      ODD,+.2
2948 0AFF 0200 A      RTS
2949 0B00 8089 B      LD      R0,INDEV      ;INPUT DEVICE  0=CP,1=KB,2=PT
2950 0B01 1303 A      BOC      ODD,+.4
2951 0B02 2DF7 A      JSR      @PR2PTR
2952 0B03 29BA A      JSR      O12B
2953 0B04 297A A      JSR      OIBUF      ;OUTPUT INPUT BUFFER IF NOT YET OUT
2954 0B05      REPERR:
2955 0B05 8096 B      LD      R0,HSPR
2956 0B06 A097 B      ST      R0,TYPMOD
2957 0B07      ;
2958 0B07      ;      ANY ERRORS TO REPORT
2959 0B07      ;
2960 0B07      $102:
2961 0B07 808B B      LD      R0,ERRPT
2962 0B08 F055 B      SKNE     R0,ERRBAS
2963 0B09 0200 A      RTS
2964 0B0A 805D B      LD      R0,PASS
2965 0B0B 1301 A      BOC      ODD,+.2
2966 0B0C 0200 A      RTS
2967 0B0D      ;      INCREMENT ERROR COUNT
2968 0B0D 7888 B      ISZ      EC
2969 0B0E 4EFC A      LI      R2,-4
2970 0B0F 8488 B      LD      R1,EC
2971 0B10 3481 A      $103:  RCPY     R1,R0
2972 0B11 602D B      AND      R0,K15
2973 0B12 1501 A      BOC      NZ,+.2
2974 0B13 C428 B      ADD      R1,K6
2975 0B14 5904 A      ROL      R1,4
2976 0B15 4A01 A      AISZ     R2,1

2977 0B16 21F9 A      JMP      $103
2978 0B17 A488 B      ST      R1,EC
2979 0B18      ;
2980 0B18      ;      OUTPUT ERROR MESSAGE
2981 0B18      ;
2982 0B18 8855 B      LD      R2,ERRBAS
2983 0B19 A922 A      ST      R2,$TMP
2984 0B1A 8921 A      $100:  LD      R2,$TMP
2985 0B1B F88B B      SKNE     R2,ERRPT
2986 0B1C 211C A      JMP      $104
2987 0B1D 7C71 B      DSZ      PGRL      ;PAGE REMAINING LINES
2988 0B1E 3081 A      NOP
2989 0B1F 8071 B      LD      R0,PGRL
2990 0B20 1B01 A      BOC      LEZ,+.2
2991 0B21 2102 A      JMP      .+3
2992 0B22 4F07 A      LI      R3,7
2993 0B23 29C3 A      JSR      OPGSTR      ;OUTPUT PAGE STRING
2994 0B24 8D18 A      LD      R3,ERRMSG
2995 0B25 29B5 A      JSR      ONLMSG      ;OUTPUT NEW LINE AND MESSAGE
2996 0B26 8915 A      LD      R2,$TMP
2997 0B27 8E00 A      LD      R3,0(R2)
2998 0B28 CD19 A      ADD      R3,MSGTAB
2999 0B29 29B2 A      JSR      OMSG
3000 0B2A 8911 A      LD      R2,$TMP
3001 0B2B      ;      OUTPUT CHAR PTR

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3002 0B2B 8E09 A      LD      R3,ELIM+1(R2)
3003 0B2C EC39 B      SKG      R3,HEX37
3004 0B2D 2101 A      JMP      .+2
3005 0B2E 2108 A      JMP      $200
3006 0B2F 2CE7 I      JSR      01B
3007 0B30 4BFF A      AISZ     R3,-1
3008 0B31 21FD A      JMP      .-2
3009 0B32 4C40 A      LI       R0,'@'/256
3010 0B33 2CE5 I      JSR      01CH
3011 0B34 808E B      LD       R0,LISTMD
3012 0B35 1501 A      BOC      NZ,+.2
3013 0B36 299D A      JSR      NEWLIN
3014 0B37 7904 A $200: ISZ      $TMP
3015 0B38 21E1 A      JMP      $100
3016 0B39 8055 B $104: LD       R0,ERRBAS
3017 0B3A A08B B      ST       R0,ERRPT
3018 0B3B 0200 A      RTS
3019 0B3C          ;
3020 0B3C 0B3D A $TMP:  .=.+1
3021 0B3D 0B3E A ERRMSG: .WORD   .+1
3022 0B3E 4552 A      .ASCII  'ERROR'
      0B3F 524F A
      0B40 5220 A
3023 0B41 0000 A      .WORD   0
3024 0B42 0B43 A MSGTAB: .WORD   .+1
3025 0B43 4D49 A      .ASCII  'MISSING AR'
      0B44 5353 A

      0B45 494E A
      0B46 4720 A
      0B47 4152 A
3026 0B48 C72E A      .WORD   'G.'+S
3027 0B49 5641 A      .ASCII  'VALUE'
      0B4A 4C55 A
      0B4B 4520 A
      0B4C 2020 A
      0B4D 2020 A
3028 0B4E A020 A      .WORD   0A020
3029 0B4F 4144 A      .ASCII  'ADDRESS'
      0B50 4452 A
      0B51 4553 A
      0B52 5320 A
      0B53 2020 A
3030 0B54 A020 A      .WORD   0A020
3031 0B55 5553 A      .ASCII  'USAGE'
      0B56 4147 A
      0B57 4520 A
      0B58 2020 A
      0B59 2020 A
3032 0B5A A020 A      .WORD   0A020
3033 0B5B 5359 A      .ASCII  'SYNTAX'
      0B5C 4E54 A
      0B5D 4158 A
      0B5E 2020 A
      0B5F 2020 A
3034 0B60 A020 A      .WORD   0A020
3035 0B61 4558 A      .ASCII  'EXCESS ARG'
      0B62 4345 A
      0B63 5353 A
      0B64 2041 A
      0B65 5247 A
3036 0B66 AE20 A      .WORD   '.'+S
3037 0B67 5442 A      .ASCII  'TBL OVERFL'
      0B68 4C20 A

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0B69 4F56 A
0B6A 4552 A
0B6B 464C A
3038 0B6C CF57 A      .WORD    'OW'+S
3039 0B6D 554E A      .ASCII    'UNDEFINED '
0B6E 4445 A
0B6F 4649 A
0B70 4E45 A
0B71 4420 A
3040 0B72 A020 A      .WORD    0A020
3041 0B73 4455 A      .ASCII    'DUP. DEF. '
0B74 502E A
0B75 2044 A
0B76 4546 A
0B77 2E20 A
3042 0B78 A020 A      .WORD    0A020
3043 0B79 4558 A      .ASCII    'EXTD. INST'
0B7A 5444 A
0B7B 2E20 A
0B7C 494E A
0B7D 5354 A
3044 0B7E AE20 A      .WORD    '.'+S
3045 0B7F          .PAGE    'OUTPUT INPUT BUFFER'
3046 0B7F          .LOCAL
3047 0B7F          ;
3048 0B7F 806A B OIBUF: LD      R0,MOFLAG      JSR OIBUF
3049 0B80 1101 A      BOC      Z,$1
3050 0B81 0200 A      RTS
3051 0B82 805D B $1:   LD      R0,PASS
3052 0B83 1301 A      BOC      ODD,.+2
3053 0B84 2120 A      JMP      $2
3054 0B85 8089 B      LD      R0,INDEV      ;INPUT DEVICE 0=CR,1=KB,2=PT
3055 0B86 131E A      BOC      ODD,$2
3056 0B87          ;   NOT KB INPUT AND IS PASS2
3057 0B87 8012 B $8:   LD      R0,INBUFB
3058 0B88 A11F A      ST      R0,$IPTR
3059 0B89 2CE7 I      JSR      O1B
3060 0B8A 8D1D A $5:   LD      R3,$IPTR
3061 0B8B ED1D A      SKG      R3,$IBEND
3062 0B8C 2101 A      JMP      $3
3063 0B8D 2117 A      JMP      $2      ;FINISHED
3064 0B8E          ;
3065 0B8E 8300 A $3:   LD      R0,0(R3)
3066 0B8F F034 B      SKNE     R0,BLANK
3067 0B90 2107 A      JMP      $4
3068 0B91 F047 B $7:   SKNE     R0,CR
3069 0B92 2112 A      JMP      $2
3070 0B93 F092 B      SKNE     R0,NOCOM      ;NO COMMENT TEST (';' IF NO COMMENTS)
3071 0B94 2110 A      JMP      $2
3072 0B95 2CE5 I      JSR      O1CH
3073 0B96 7911 A      ISZ      $IPTR
3074 0B97 21F2 A      JMP      $5
3075 0B98 4B01 A $4:   AISZ     R3,1
3076 0B99 ED0F A      SKG      R3,$IBEND
3077 0B9A 2101 A      JMP      $6
3078 0B9B 2109 A      JMP      $2      ;FINISHED
3079 0B9C          ;
3080 0B9C 8300 A $6:   LD      R0,0(R3)
3081 0B9D F034 B      SKNE     R0,BLANK
3082 0B9E 21F9 A      JMP      $4
3083 0B9F F092 B      SKNE     R0,NOCOM      ;NO COMMENT TEST (';' IF NO COMMENTS)
3084 0BA0 2104 A      JMP      $2

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3085 0BA1 F047 B      SKNE    R0,CR
3086 0BA2 2102 A      JMP     $2
3087 0BA3 9104 A      LD      R0,@$IPTR
3088 0BA4 21EC A      JMP     $7
3089 0BA5             ;      FINISHED OUTPUT OF INPUT BUFFER
3090 0BA5             $2:
3091 0BA5 4C0D A      LI      R0,0D
3092 0BA6 A06A B      ST      R0,MOFLAG      ;SET MOFLAG      NZ=SOURCE ALREADY OUTPUT
3093 0BA7 0200 A      RTS
3094 0BA8 0BA9 A      $IPTR:  .=.+1
3095 0BA9 0154 A      $IBEND: .WORD    INBUF+52

3096 0BAA             .PAGE    'INPUT ROUTINES'
3097 0BAA             .LOCAL
3098 0BAA             READ:
3099 0BAA 8012 B      LD      R0,INBUFB
3100 0BAB A05E B      ST      R0,INPTR      ;INPUT CHAR PTR
3101 0BAC A05F B      ST      R0,LCPTR
3102 0BAD 805D B      LD      R0,PASS
3103 0BAE 1303 A      BOC     ODD,$PRM
3104 0BAF             ; PASS=0
3105 0BAF 8089 B      $61:    LD      R0,INDEV
3106 0BB0 1301 A      BOC     ODD,$PRM
3107 0BB1 2106 A      JMP     $NOPRT
3108 0BB2             ;
3109 0BB2             ;      EITHER KB INPUT OR 2ND PASS OR BOTH
3110 0BB2             ;      BUT NOT (DSKTMP AND KB AND PASS.NE.0)
3111 0BB2             ;
3112 0BB2 788D B      $PRM:   ISZ     LCNT2
3113 0BB3 2103 A      JMP     $50
3114 0BB4 8031 B      LD      R0,X6666
3115 0BB5 A08D B      ST      R0,LCNT2
3116 0BB6 788C B      ISZ     LCNT1
3117 0BB7 2D1A A      $50:    JSR     @SPROMPT
3118 0BB8             ;
3119 0BB8             ;      FINISHED PRINTING LINE NUM AND PROMPT,NOW READ INPUT
3120 0BB8             ;
3121 0BB8             $NOPRT:
3122 0BB8             ;      TTY INPUT
3123 0BB8 291A A      $10:    JSR     RDTTY
3124 0BB9 2114 A      JMP     $10A
3125 0BBA             ;      COMPUTE SOURCE CHECKSUM
3126 0BBA 805D B      $10B:   LD      R0,PASS
3127 0BBB 1504 A      BOC     NZ,+.5
3128 0BBC 8020 B      LD      R0,DSKTMP
3129 0BBD 5000 A      CAI     R0,0
3130 0BBE 1201 A      BOC     P,+.2
3131 0BBF 2C16 B      JSR     @WDSKTM
3132 0BC0 9012 B      LD      R0,@INBUFB
3133 0BC1 F092 B      SKNE    R0,NOCOM
3134 0BC2 21F5 A      JMP     $NOPRT
3135 0BC3 4C0D A      LI      R0,0D
3136 0BC4 94AA I      LD      R1,SOUCK
3137 0BC5 8C12 B      LD      R3,INBUFB
3138 0BC6 F300 A      $11C:   SKNE    R0,0(R3)
3139 0BC7 0200 A      RTS
3140 0BC8 C700 A      ADD     R1,0(R3)
3141 0BC9 B4AA I      ST      R1,SOUCK
3142 0BCA 4B01 A      AISZ    R3,1
3143 0BCB FD5C A      SKNE    R3,$IBL
3144 0BCC 0200 A      RTS
3145 0BCD 21F8 A      JMP     $11C
3146 0BCE             ;
3147 0BCE             ;

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3148 0BCE 8089 B $10A: LD      R0,INDEV      ;INPUT DEVICE 0=CR,1=KB,2=PT
3149 0BCF 1301 A      BOC      ODD,+.2
3150 0BD0 21E7 A      JMP      $10
3151 0BD1      ;      INPUT DEVICE IS KB,MUST REPROMPT
3152 0BD1 21E5 A      JMP      $50
3153 0BD2 0C3E A $PROMPT:.WORD  PROMPT
3154 0BD3      ;
3155 0BD3      ;      READ TELETYPE
3156 0BD3      ;
3157 0BD3 4EB8 A RDTTY: LI      R2,-72
3158 0BD4 8C12 B      LD      R3,INBUFB
3159 0BD5 AC5E B      ST      R3,INPTR      ;INPUT CHAR PTR
3160 0BD6 8089 B $12:  LD      R0,INDEV
3161 0BD7 1302 A      BOC      ODD,$12B
3162 0BD8 2C0F B $GC:  JSR      @GETC
3163 0BD9 2104 A      JMP      $12A
3164 0BDA 805D B $12B: LD      R0,PASS
3165 0BDB D040 B      SUB      R0,K2
3166 0BDC 11FB A      BOC      Z,$GC
3167 0BDD 2C14 B      JSR      @ECHOGC
3168 0BDE 603A B $12A: AND      R0,HEX7F
3169 0BDF 11F6 A      BOC      Z,$12
3170 0BE0 F047 B      SKNE     R0,CR
3171 0BE1 210F A      JMP      $11B
3172 0BE2 F134 A      SKNE     R0,$LF
3173 0BE3 21F2 A      JMP      $12
3174 0BE4 F03A B      SKNE     R0,HEX7F      ;RUBOUT
3175 0BE5 21F0 A      JMP      $12
3176 0BE6 F12E A      SKNE     R0,HEX5F      ;BACKSPACE ARROW
3177 0BE7 212A A      JMP      $BKSP
3178 0BE8 F12D A      SKNE     R0,HEX7D      ;ALT KEY
3179 0BE9 0200 A      RTS
3180 0BEA F02B B      SKNE     R0,K9
3181 0BEB 210E A      JMP      $TAB
3182 0BEC A300 A      ST      R0,0(R3)
3183 0BED 4B01 A      AISZ     R3,1
3184 0BEE 4A01 A      AISZ     R2,1
3185 0BEF 21E6 A      JMP      $12
3186 0BF0 0201 A      RTS      1
3187 0BF1 A300 A $11B: ST      R0,0(R3)
3188 0BF2 8089 B      LD      R0,INDEV      ;INPUT DEVICE 0=CR,1=KB,2=PT
3189 0BF3 605D B      AND      R0,PASS
3190 0BF4 1301 A      BOC      ODD,+.2
3191 0BF5 0201 A      RTS      1
3192 0BF6      ;      INPUT IS KB AND THIS IS PASS2 THEREFORE BACKUP CARRAGE
3193 0BF6 4C0D A      LI      R0,0D
3194 0BF7 2CE5 I      JSR      01CH
3195 0BF8 2CCF I      JSR      06B
3196 0BF9 0201 A      RTS      1
3197 0BFA      ;
3198 0BFA E914 A $TAB: SKG      R2,KM41
3199 0BFB 2101 A      JMP      .+2

3200 0BFC 21D9 A      JMP      $12      ; IGNORE IF > COL. 32
3201 0BFD 4D28 A      LI      R1,40
3202 0BFE E911 A      SKG      R2,KM57
3203 0BFF 4D38 A      LI      R1,56
3204 0C00 E910 A      SKG      R2,KM65
3205 0C01 4D40 A      LI      R1,64
3206 0C02 3900 A      RADD     R2,R1
3207 0C03 8034 B $TAB1: LD      R0,BLANK
3208 0C04 A300 A      ST      R0,0(R3)
3209 0C05 8089 B      LD      R0,INDEV

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3210 0C06 D040 B      SUB      R0,K2
3211 0C07 1102 A      BOC      Z,+.3
3212 0C08 8034 B      LD       R0,BLANK
3213 0C09 2C10 B      JSR      @PUTC
3214 0C0A 4B01 A      AISZ     R3,1
3215 0C0B 4A01 A      AISZ     R2,1
3216 0C0C 4901 A      AISZ     R1,1
3217 0C0D 21F5 A      JMP      $TAB1
3218 0C0E 21C7 A      JMP      $12
3219 0C0F FFD7 A KM41: .WORD    -41
3220 0C10 FFC7 A KM57: .WORD    -57
3221 0C11 FFBF A KM65: .WORD    -65
3222 0C12          ;
3223 0C12 4BFF A $BKSP: AISZ     R3,-1
3224 0C13 4AFF A      AISZ     R2,-1
3225 0C14 21C1 A      JMP      $12
3226 0C15 005F A HEX5F: .WORD    05F
3227 0C16 007D A HEX7D: .WORD    07D
3228 0C17 000A A $LF:   .WORD    0A
3229 0C18 0C19 A LCNT2A: .+.1
3230 0C19          ;
3231 0C19          ;      GET NEXT VALID CHAR
3232 0C19          ;
3233 0C19          ;      JSR      GNVC
3234 0C19          ;      NONE
3235 0C19          ;      CHAR. IN R0
3236 0C19          ;
3237 0C19 4D01 A GNVC:  LI      R1,1
3238 0C1A 8C5E B $1:   LD      R3,INPTR      ;INPUT CHAR PTR
3239 0C1B FD0C A      SKNE     R3,$IBL      ;INBUF LAST ADR + 1
3240 0C1C 0200 A      RTS              ;STAT. END
3241 0C1D 8300 A      LD      R0,0(R3)      ;LOAD NEXT CHAR
3242 0C1E F047 B      SKNE     R0,CR        ;CHAR. RET. CHAR.
3243 0C1F 0200 A      RTS
3244 0C20 F049 B      SKNE     R0,SEMI      ;SEMICOLAN
3245 0C21 2109 A      JMP      $2
3246 0C22 F034 B      SKNE     R0,BLANK
3247 0C23 210A A      JMP      $3
3248 0C24          $RETC:
3249 0C24 785E B      ISZ      INPTR      ;INPUT CHAR PTR
3250 0C25 0201 A      RTS      1
3251 0C26          ;

3252 0C26          ;      GET NEXT CHAR -      GNC 0 , GNVC 1 , GNCVC 2
3253 0C26          ;
3254 0C26          ;      JSR      GNC
3255 0C26          ;      NONE
3256 0C26          ;      CHAR IN R0
3257 0C26          ;
3258 0C26 4D00 A GNC:  LI      R1,0
3259 0C27 21F2 A      JMP      $1
3260 0C28          ;
3261 0C28 0168 A $IBL: .WORD    INBUF+72
3262 0C29          ;
3263 0C29 4D02 A GNCVC: LI      R1,2
3264 0C2A 21EF A      JMP      $1
3265 0C2B          ;      SEMICOLAN
3266 0C2B 7427 B $2:   SKAZ     R1,K3
3267 0C2C 0200 A      RTS              ;SEMI IS TERMINATOR      GNVC,GNCVC
3268 0C2D 21F6 A      JMP      $RETC
3269 0C2E          ;      BLANK
3270 0C2E 785E B $3:   ISZ      INPTR      ;INPUT CHAR PTR
3271 0C2F F423 B      SKNE     R1,ZERO
3272 0C30 0201 A      RTS      1

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3273 0C31 F426 B      SKNE    R1,K1
3274 0C32 21E7 A      JMP      $1          ;SKIP BLANK      GNVC
3275 0C33 7C5E B      DSZ      INPTR      ;INPUT CHAR PTR  ;BLANK TERMINATES GNCV
3276 0C34 0200 A      RTS      0
3277 0C35              ;
3278 0C35              ;      PROMPT SUBROUTINE
3279 0C35              ;
3280 0C35 808E B PRMPT2: LD      R0,LISTMD
3281 0C36 2101 A      JMP      .+2
3282 0C37 808F B PRMPT1: LD      R0,ERRLST
3283 0C38 1101 A      BOC      Z,+.2
3284 0C39 0200 A      RTS
3285 0C3A 805D B      LD      R0,PASS
3286 0C3B F026 B      SKNE    R0,K1
3287 0C3C 2101 A      JMP      .+2
3288 0C3D 0200 A      RTS
3289 0C3E 4200 A PROMPT: PUSH    R2
3290 0C3F 4100 A      PUSH    R1
3291 0C40 2CA8 I      JSR      NEWLIN
3292 0C41 7C71 B      DSZ      PGRL
3293 0C42 2102 A      JMP      .+3
3294 0C43 4F07 A      LI      R3,7
3295 0C44 2CD9 I      JSR      OPGSTR      ;OUTPUT PAGE STRING
3296 0C45 808C B      LD      R0,LCNT1
3297 0C46 4D20 A      LI      R1,''/256
3298 0C47 F038 B      SKNE    R0,CZERO      ;'0'/256
3299 0C48 2103 A      JMP      $51
3300 0C49 4D30 A      LI      R1,'0'/256
3301 0C4A 2CE5 I      JSR      O1CH
3302 0C4B 2101 A      JMP      $52
3303 0C4C 2CE7 I $51:  JSR      O1B

3304 0C4D              ;      NOW OUTPUT LAST 4 CHAR OF LINE NUMBER
3305 0C4D 888D B $52:  LD      R2,LCNT2
3306 0C4E A9C9 A      ST      R2,LCNT2A
3307 0C4F 2CCA I      JSR      OSPDEC      ;OUTPUT SPECIAL DECIMAL 4 TIMES
3308 0C50 A88D B      ST      R2,LCNT2
3309 0C51 2CE7 I      JSR      O1B
3310 0C52 8089 B      LD      R0,INDEV      ;INPUT DEVICE 0=CR,1=KB,2=PT
3311 0C53 605D B      AND      R0,PASS
3312 0C54 1301 A      BOC      ODD,+.2
3313 0C55 2102 A      JMP      $NK2      ;NOT KB INPUT AND PASS2 BOTH
3314 0C56 2CCF I      JSR      O6B
3315 0C57 2CCF I      JSR      O6B
3316 0C58              ;
3317 0C58 8089 B $NK2: LD      R0,INDEV      ;INPUT DEVICE 0=CR,1=KB,2=PT
3318 0C59 1301 A      BOC      ODD,+.2
3319 0C5A 2102 A      JMP      .+3
3320 0C5B              ;      KB INPUT ,ISSUE PROMPT
3321 0C5B 4C2A A      LI      R0,'*/256
3322 0C5C 2CE5 I      JSR      O1CH
3323 0C5D 4500 A      PULL     R1
3324 0C5E 4600 A      PULL     R2
3325 0C5F 0200 A      RTS

3326 0C60              .PAGE    'OBJECT MODULE ROUTINES'
3327 0C60              .LOCAL
3328 0C60              ;
3329 0C60              ;      INITIALIZE OBJECT RECORD
3330 0C60              ;
3331 0C60 8179 A INITOR: LD      R0,OBJPT1
3332 0C61 A177 A      ST      R0,OBJPTR
3333 0C62 810B A      LD      R0,X8004
3334 0C63 A163 A      ST      R0,OBJREC

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3335 0C64 806B B      LD      R0,SECT
3336 0C65 D026 B      SUB     R0,K1
3337 0C66 A162 A      ST      R0,OBJREC+2
3338 0C67 805C B      LD      R0,LOCCTR
3339 0C68 A161 A      ST      R0,OBJREC+3
3340 0C69 4C00 A      LI      R0,0
3341 0C6A A160 A      ST      R0,WORD5
3342 0C6B 4C03 A      LI      R0,3
3343 0C6C A15F A      ST      R0,WORD6          ; ND RELOCATION WORD
3344 0C6D 0200 A      RTS
3345 0C6E 8004 A X8004: .WORD  08004
3346 0C6F          ;
3347 0C6F          ;      OUTPUT OBJECT WORD  (WORD IN R0, REL IN R2)
3348 0C6F          ;
3349 0C6F          ;      OOWORD:
3350 0C6F B169 A      ST      R0,@OBJPTR
3351 0C70 E82C B      SKG     R2,K4
3352 0C71 2101 A      JMP     .+2
3353 0C72 4E04 A      LI      R2,4
3354 0C73 F823 B      SKNE    R2,ZERO
3355 0C74 4E01 A      LI      R2,1
3356 0C75 D826 B      SUB     R2,K1
3357 0C76 2913 A      JSR     SHIFT          ;STORE REL BITS
3358 0C77 7961 A      ISZ     OBJPTR
3359 0C78 794E A      ISZ     OBJREC
3360 0C79 815F A      LD      R0,OBJPTR
3361 0C7A F160 A      SKNE    R0,OBJPT2
3362 0C7B 2101 A      JMP     OOREC
3363 0C7C 0200 A      RTS
3364 0C7D          ;
3365 0C7D          ;      OUTPUT OBJECT RECORD
3366 0C7D          ;      IF ANY AND SET UP NEW RECORD
3367 0C7D          ;
3368 0C7D          ;      OOREC:
3369 0C7D 815B A      LD      R0,OBJPTR
3370 0C7E F15B A      SKNE    R0,OBJPT1
3371 0C7F 21E0 A      JMP     INITOR          ;RECORD EMPTY ,INIT AND RETURN
3372 0C80          ;      NOT EMPTY,SHIFT REL BITS
3373 0C80 4E00 A      LI      R2,0
3374 0C81 8149 A $22: LD      R0,WORD5
3375 0C82 1204 A      BOC     P,$21
3376 0C83 2906 A      JSR     SHIFT
3377 0C84 8D04 A      LD      R3,$OR

3378 0C85 2910 A      JSR     CKPNCH          ;CHECKSUM AND PUNCH
3379 0C86 21D9 A      JMP     INITOR          ;INIT NEW RECORD AND RETURN
3380 0C87 2902 A $21: JSR     SHIFT
3381 0C88 21F8 A      JMP     $22
3382 0C89 0CC7 A $OR:  .WORD  OBJREC
3383 0C8A          ;
3384 0C8A          ;      SHIFT      SHIFT WORD5,WORD6 LEFT 2
3385 0C8A          ;      FILLING FROM  R2 BITS 2,1
3386 0C8A          ;
3387 0C8A          ;      SHIFT:
3388 0C8A 8541 A      LD      R1,WORD6
3389 0C8B 813F A      LD      R0,WORD5
3390 0C8C 5C02 A      SHL     R0,2
3391 0C8D 5902 A      ROL     R1,2
3392 0C8E 6427 B      AND     R1,K3
3393 0C8F 3400 A      RADD    R1,R0
3394 0C90 A13A A      ST      R0,WORD5
3395 0C91 853A A      LD      R1,WORD6
3396 0C92 5D02 A      SHL     R1,2
3397 0C93 3900 A      RADD    R2,R1

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3398 0C94 A537 A      ST      R1,WORD6
3399 0C95 0200 A      RTS
3400 0C96          ;
3401 0C96          ;      CHECKSUM AND PUNCH RECORD POINTED TO BY R3
3402 0C96          ;
3403 0C96      CKPNCH:
3404 0C96 AD2F A      ST      R3,$TMP
3405 0C97 805D B      LD      R0,PASS
3406 0C98 1401 A      BOC     B1EQ1,+.2
3407 0C99 0200 A      RTS
3408 0C9A 801E B      LD      R0,DSKOBJ
3409 0C9B 1204 A      BOC     P,$33      ; NO LEADER IF DISK OBJ
3410 0C9C          ;      PUNCH LEADER AND STX CHAR
3411 0C9C 2922 A      JSR     LEAD8
3412 0C9D 4C02 A      LI      R0,2
3413 0C9E A00C A      ST      R0,PNCHMD      ; SET PUNCH MODE
3414 0C9F 2CE5 I      JSR     O1CH
3415 0CA0          ;      COMPUTE CHECKSUM
3416 0CA0      $33:
3417 0CA0 8700 A      LD      R1,0(R3)
3418 0CA1 643B B      AND     R1,HEX3F
3419 0CA2 4C00 A      LI      R0,0
3420 0CA3 C302 A      ADD     R0,2(R3)
3421 0CA4 4B01 A      AISZ    R3,1
3422 0CA5 49FF A      AISZ    R1,-1
3423 0CA6 21FC A      JMP     .-3
3424 0CA7 8D1E A      LD      R3,$TMP
3425 0CA8 A301 A      ST      R0,1(R3)      ;STORE CHECKSUM
3426 0CA9 9111 A      LD      R0,@$ENDBUF
3427 0CAA F300 A      SKNE    R0,0(R3)
3428 0CAB 2103 A      JMP     .+4
3429 0CAC 90AB I      LD      R0,OBJCK

3430 0CAD C301 A      ADD     R0,1(R3)
3431 0CAE B0AB I      ST      R0,OBJCK
3432 0CAF          ;      FINISHED CHECKSUM , NOW PUNCH
3433 0CAF 8700 A      LD      R1,0(R3)
3434 0CB0 643B B      AND     R1,HEX3F
3435 0CB1 C440 B      ADD     R1,K2
3436 0CB2          ;      TOP OF PUNCH LOOP
3437 0CB2 8300 A      $30:    LD      R0,0(R3)
3438 0CB3 2CC9 I      JSR     O2CH
3439 0CB4          $31:
3440 0CB4 4B01 A      AISZ    R3,1
3441 0CB5 49FF A      AISZ    R1,-1
3442 0CB6 21FB A      JMP     $30
3443 0CB7 2CA8 I      JSR     NEWLIN
3444 0CB8 4C00 A      ENDPCH: LI      R0,0
3445 0CB9 A00C A      ST      R0,PNCHMD
3446 0CBA 0200 A      RTS
3447 0CBB 0402 A      $ENDBUF:.WORD ENDBUF
3448 0CBC          ;
3449 0CBC          ;      PUNCH 2 CHARACTERS
3450 0CBC          ;
3451 0CBC          ;
3452 0CBC          ;      PUNCH LEADER
3453 0CBC          ;
3454 0CBC 2900 A      LEAD:   JSR     .+1
3455 0CBD 2900 A      JSR     .+1
3456 0CBE 2900 A      JSR     .+1
3457 0CBF 2900 A      LEAD8: JSR     .+1
3458 0CC0 2900 A      JSR     .+1
3459 0CC1 4C01 A      LI      R0,1
3460 0CC2 A00C A      ST      R0,PNCHMD

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3461 0CC3 4C00 A      LI      R0,0
3462 0CC4 2CC9 I      JSR      O2CH
3463 0CC5 21F2 A      JMP      ENDPCH
3464 0CC6              ;
3465 0CC6 0CC7 A $TMP:  .=.+1
3466 0CC7              ;
3467 0CC7              ;      OBJECT MODULE DATA RECORD
3468 0CC7              ;
3469 0CC7 0CC9 A OBJREC: .=.+2
3470 0CC9 0CCA A WORD3:  .=.+1
3471 0CCA 0CCB A WORD4:  .=.+1
3472 0CCB 0CCC A WORD5:  .=.+1
3473 0CCC 0CD9 A WORD6:  .=.+13
3474 0CD9              ;
3475 0CD9 0CCD A OBJPTR: .WORD  WORD6+1
3476 0CDA 0CCD A OBJPT1: .WORD  WORD6+1
3477 0CDB 0CD9 A OBJPT2: .WORD  OBJREC+18

3478 0CDC              .PAGE  'MISC SUBROUTINES'
3479 0CDC              .LOCAL
3480 0CDC              ;
3481 0CDC              ;      IFBYP      GO TO DIREND IF IN IFSKIP MODE
3482 0CDC              ;
3483 0CDC 8070 B IFBYP: LD      R0,IFMODE
3484 0CDD 1507 A      BOC      NZ,$2
3485 0CDE 24C8 I      JMP      NEXTST
3486 0CDF              ;
3487 0CDF              ;      JSR      IFSKIP
3488 0CDF              ;      SUSPEND ASSEMBLY RET
3489 0CDF              ;      ASSEMBLE RETURN
3490 0CDF 8070 B IFSKIP: LD      R0,IFMODE
3491 0CE0 1501 A      BOC      NZ,$1
3492 0CE1 0200 A      RTS      0      ;SUSPEND
3493 0CE2 0201 A $1:   RTS      1      ;ASSEMBLE
3494 0CE3              ;
3495 0CE3              ;
3496 0CE3              ;      SKIP IF PASS 1
3497 0CE3              ;
3498 0CE3 805D B P2P1: LD      R0,PASS      ;PASS1=0  PASS2=NZ
3499 0CE4 11FD A      BOC      Z,$1
3500 0CE5 0200 A $2:   RTS
3501 0CE6              ;
3502 0CE6              ;      SKIP IF PASS 2
3503 0CE6              ;
3504 0CE6 805D B P1P2: LD      R0,PASS
3505 0CE7 15FA A      BOC      NZ,$1
3506 0CE8 0200 A      RTS
3507 0CE9              ;
3508 0CE9              ;      OUTPUT SPECIAL DECIMAL DIGIT
3509 0CE9              ;
3510 0CE9              ;      OSPDEC:
3511 0CE9 4FFC A      LI      R3,-4
3512 0CEA 5A04 A      ROL      R2,4
3513 0CEB 4C0F A      LI      R0,0F
3514 0CEC 3883 A      RAND     R2,R0
3515 0CED F028 B      SKNE     R0,K6
3516 0CEE 2106 A      JMP      $60      ;ZERO REPRESENTED
3517 0CEF 1502 A      BOC      NZ,$61
3518 0CF0 C828 B      ADD      R2,K6
3519 0CF1 8028 B      LD      R0,K6
3520 0CF2 C03C B $61:  ADD      R0,HEX2A
3521 0CF3 4D30 A      LI      R1,'0'/256
3522 0CF4 2101 A      JMP      .+2
3523 0CF5 3481 A $60:  RCPY     R1,R0

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3524 0CF6 2CE5 I      JSR      01CH
3525 0CF7 4B01 A      AISZ     R3,1
3526 0CF8 21F1 A      JMP      OSPDEC+1
3527 0CF9 0200 A      RTS
3528 0CFA          ;
3529 0CFA          .LOCAL

3530 0CFA          ;
3531 0CFA          ;      GET COMMA
3532 0CFA          ;      JSR      GCOMMA
3533 0CFA          ;      NO COMMA OR END RETURN
3534 0CFA          ;      YES COMMA RETURN
3535 0CFA          GCOMMA:
3536 0CFA A117 A      ST        R0,$T0
3537 0CFB A517 A      ST        R1,$T0+1
3538 0CFC A917 A      ST        R2,$T0+2
3539 0CFD AD17 A      ST        R3,$T0+3
3540 0CFE 2C9C I      JSR      GNVC
3541 0CFE 2103 A      JMP      .+4          ;NO MORE
3542 0D00 F04F B      SKNE     R0,COMMA
3543 0D01 2106 A      JMP      $1
3544 0D02 7C5E B      DSZ      INPTR          ;INPUT CHAR PTR
3545 0D03 810E A      LD        R0,$T0
3546 0D04 850E A      LD        R1,$T0+1
3547 0D05 890E A      LD        R2,$T0+2
3548 0D06 8D0E A      LD        R3,$T0+3
3549 0D07 0200 A      RTS      0          ;NOT A COMMA
3550 0D08          ;      YES-COMMA
3551 0D08 2C9C I $1:   JSR      GNVC
3552 0D09 2102 A      JMP      .+3
3553 0D0A 7C5E B      DSZ      INPTR
3554 0D0B 2101 A      JMP      .+2
3555 0D0C 2D09 A      JSR      @SMERROR
3556 0D0D 8104 A      LD        R0,$T0
3557 0D0E 8504 A      LD        R1,$T0+1
3558 0D0F 8904 A      LD        R2,$T0+2
3559 0D10 8D04 A      LD        R3,$T0+3
3560 0D11 0201 A      RTS      1
3561 0D12 0D16 A $T0:  .=.+4
3562 0D16 0979 A $MERROR: .WORD  MERROR
3563 0D17 0000 A DSKERR: HALT
3564 0D18          .ENDIF

3565 0D18          .PAGE      'PROCESS CONTROL STATEMENT'
3566 0D18          .LOCAL
3567 0D18          ;
3568 0D18          ;      PROCESS CONTROL STATEMENT
3569 0D18          ;
3570 0D18          PRCTRL:
3571 0D18 2915 A      JSR      $GNAM
3572 0D19 210F A      JMP      $4
3573 0D1A 8D20 A      LD        R3,$CTAB
3574 0D1B 8300 A $3:   LD        R0,0(R3)
3575 0D1C 1104 A      BOC       Z,$1          ;FINISHED SEARCH AND NOT FOUND
3576 0D1D F07D B      SKNE     R0,NAM0      ;1ST 2 CHARACTERS OF NAME
3577 0D1E 2103 A      JMP      $2
3578 0D1F 4B03 A      AISZ     R3,3
3579 0D20 21FA A      JMP      $3          ;LOOP
3580 0D21 0200 A $1:   RTS          ;ILLEGAL NAME
3581 0D22          ;      FOUND
3582 0D22 8301 A $2:   LD        R0,1(R3)
3583 0D23 B302 A      ST        R0,@2(R3)
3584 0D24 2C9C I      JSR      GNVC
3585 0D25 2103 A      JMP      $4

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3586 0D26 F04F B      SKNE    R0,COMMA
3587 0D27 21F0 A      JMP     PRCTRL
3588 0D28 0200 A      RTS
3589 0D29 808F B $4:   LD      R0,ERRLST
3590 0D2A 1501 A      BOC     NZ,+.2
3591 0D2B A091 B      ST      R0,NOLIST
3592 0D2C 0201 A      RTS     1
3593 0D2D 027F A K639: .WORD   639
3594 0D2E           ;
3595 0D2E           ;
3596 0D2E           $GNAM:
3597 0D2E 2C9C I      JSR     GNVC
3598 0D2F 0200 A      RTS
3599 0D30 5C08 A      SHL     R0,8
3600 0D31 A07D B      ST      R0,NAM0           ;1ST 2 CHARACTERS OF NAME
3601 0D32 2C9C I      JSR     GNVC
3602 0D33 4C20 A $10: LI      R0,' '/256
3603 0D34 F04F B      SKNE    R0,COMMA
3604 0D35 2103 A      JMP     $11
3605 0D36 C07D B      ADD     R0,NAM0           ;1ST 2 CHARACTERS OF NAME
3606 0D37 A07D B      ST      R0,NAM0           ;1ST 2 CHARACTERS OF NAME
3607 0D38 0201 A      RTS     1
3608 0D39 7C5E B $11: DSZ     INPTR           ;INPUT CHAR PTR
3609 0D3A 21F8 A      JMP     $10
3610 0D3B           ;
3611 0D3B           ; CONTROL STATEMENT TABLE
3612 0D3B           ;
3613 0D3B 0D3C A $CTAB: .WORD   .+1
3614 0D3C 4B42 A      .WORD   'KB',1,INDEV
3615 0D3F 5054 A      .WORD   'PT',2,INDEV
3616 0D42 4F4D A      .WORD   'OM',1,OBJMOD
3617 0D45 5820 A      .WORD   'X ',1,XINOK
3618 0D48 4E4C A      .WORD   'NL',0,NOLIST
3619 0D4B 4E43 A      .WORD   'NC','';'/256,NOCOM
3620 0D4E 454C A      .WORD   'EL',0,ERRLST
3621 0D51 4E4D A      .WORD   'NM',0,NOMAP
3622 0D54 0000 A      .WORD   0
3623 0D55           .PAGE   'ERROR SUBROUTINE'
3624 0D55           .LOCAL
3625 0D55           ERROR:
3626 0D55 A92D A      ST      R2,$TR2
3627 0D56 4000 A      PUSH    R0
3628 0D57 805E B      LD      R0,INPTR
3629 0D58 A05F B      ST      R0,LCPTR
3630 0D59 7C5F B $3:   DSZ     LCPTR
3631 0D5A 905F B      LD      R0,@LCPTR

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3632 0D5B F034 B      SKNE    R0,BLANK
3633 0D5C 21FC A      JMP     $3
3634 0D5D 785F B      ISZ     LCPTR
3635 0D5E 4400 A      PULL    R0
3636 0D5F 4000 A      PUSH    R0
3637 0D60 888B B      LD      R2,ERRPT
3638 0D61 F90E A      SKNE    R2,$ERRMX
3639 0D62 210A A      JMP     $1
3640 0D63 A200 A      ST      R0,0(R2)
3641 0D64 805F B      LD      R0,LCPTR
3642 0D65 D012 B      SUB     R0,INBUFB
3643 0D66 F208 A      SKNE    R0,ELIM(R2)
3644 0D67 2105 A      JMP     $1
3645 0D68 A209 A      ST      R0,ELIM+1(R2)
3646 0D69 808B B      LD      R0,ERRPT
3647 0D6A 788B B      ISZ     ERRPT
3648 0D6B F055 B      SKNE    R0,ERRBAS
3649 0D6C 2D17 A      JSR     @SPRMP1
3650 0D6D          $1:
3651 0D6D 4400 A $2:    PULL    R0
3652 0D6E 8914 A      LD      R2,$TR2
3653 0D6F 0200 A      RTS
3654 0D70          ;
3655 0D70 0D79 A $ERRMX: .WORD   ERBUF+ELIM
3656 0D71 0D79 A ERBUF:  .=. +ELIM
3657 0D79 FFFF A      .WORD   -1
3658 0D7A 0D82 A      .=. +ELIM
3659 0D82 2A2A A $E1:  .WORD   '**'
3660 0D83 0D84 A $TR2: .=. +1
3661 0D84 0C37 A $PRMP1: .WORD   PRMP1

3662 0D85          .PAGE   'SPECIAL DEBUGGING DIRECTIVES'

3663 0D85          .PAGE   'DIRECTIVE / INSTRUCTION TABLE'
3664 0D85          ;
3665 0D85          ;      DIRECTIVE / INSTRUCTION TABLE
3666 0D85          ;
3667 0D85          DITBLB:
3668 0D85 0000 A      .WORD   0,WORD,'.W'+S,'OR','D'
          0D86 04E5 A
          0D87 AE57 A
          0D88 4F52 A
          0D89 4420 A
3669 0D8A 0000 A      .WORD   0,EXTD,'.E'+S,'XT','D'
          0D8B 04B9 A
          0D8C AE45 A
          0D8D 5854 A
          0D8E 4420 A
3670 0D8F 0000 A      .WORD   0,LIST,'.L'+S,'IS','T'
          0D90 0527 A
          0D91 AE4C A
          0D92 4953 A
          0D93 5420 A
3671 0D94 0000 A      .WORD   0,ELSE,'.E'+S,'LS','E'
          0D95 048E A
          0D96 AE45 A
          0D97 4C53 A
          0D98 4520 A
3672 0D99 0000 A      .WORD   0,PAGE,'.P'+S,'AG','E'
          0D9A 04FC A
          0D9B AE50 A
          0D9C 4147 A
          0D9D 4520 A
3673 0D9E 0000 A      .WORD   0,IF,'.I','F'

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0D9F 0474 A
0DA0 2E49 A
0DA1 4620 A
3674 0DA2 0000 A      .WORD    0,END,'.E','ND'
0DA3 0379 A
0DA4 2E45 A
0DA5 4E44 A
3675 0DA6 0000 A      .WORD    0,TITLE,'.T'+S,'IT','LE'
0DA7 053D A
0DA8 AE54 A
0DA9 4954 A
0DAA 4C45 A
3676 0DAB 0000 A      .WORD    0,ASECT,'.A'+S,'SE','CT'
0DAC 04A6 A
0DAD AE41 A
0DAE 5345 A
0DAF 4354 A
3677 0DB0 0000 A      .WORD    0,BSECT,'.B'+S,'SE','CT'
0DB1 04B5 A
0DB2 AE42 A
0DB3 5345 A

0DB4 4354 A
3678 0DB5 0000 A      .WORD    0,TSECT,'.T'+S,'SE','CT'
0DB6 04B7 A
0DB7 AE54 A
0DB8 5345 A
0DB9 4354 A
3679 0DBA 0000 A      .WORD    0,SPACE,'.S'+S,'PA','CE'
0DBB 0513 A
0DBC AE53 A
0DBD 5041 A
0DBE 4345 A
3680 0DBF 0000 A      .WORD    0,GLOBL,'.G'+S,'LO','BL'
0DC0 04C8 A
0DC1 AE47 A
0DC2 4C4F A
0DC3 424C A
3681 0DC4 0000 A      .WORD    0,LOCAL,'.L'+S,'OC','AL'
0DC5 04DB A
0DC6 AE4C A
0DC7 4F43 A
0DC8 414C A
3682 0DC9 0000 A      .WORD    0,ASCII,'.A'+S,'SC','II'
0DCA 04EE A
0DCB AE41 A
0DCC 5343 A
0DCD 4949 A
3683 0DCE 0000 A      .WORD    0,ENDIF,'.E'+S,'ND','IF'
0DCF 049B A
0DD0 AE45 A
0DD1 4E44 A
0DD2 4946 A
3684 0DD3 0000 A      .WORD    0,ASMDIR,'.A','SM'
0DD4 0539 A
0DD5 2E41 A
0DD6 534D A
3685 0DD7      ;
3686 0DD7      ;
3687 0DD7      ;
3688 0DD7 8000 A      LD        0,0
3689 0DD8 08A7 A      .WORD    IC1,'LD',' '
0DD9 4C44 A
0DDA 2020 A

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INSTRUCTIONS

LD 0,0
.WORD IC1,'LD',' '

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3690	0DDDB	A000	A	ST	0,0
3691	0DDC	08A7	A	.WORD	IC1,'ST',
	0DDD	5354	A		
	0DDE	2020	A		
3692	0DDF	C000	A	ADD	0,0
3693	0DE0	08BB	A	.WORD	IC2,'AD', 'D '
	0DE1	4144	A		
	0DE2	4420	A		
3694	0DE3	D000	A	SUB	0,0
3695	0DE4	08BB	A	.WORD	IC2,'SU', 'B '
	0DE5	5355	A		
	0DE6	4220	A		
3696	0DE7	E000	A	SKG	0,0
3697	0DE8	08BB	A	.WORD	IC2,'SK', 'G '
	0DE9	534B	A		
	0DEA	4720	A		
3698	0DEB	F000	A	SKNE	0,0
3699	0DEC	08BB	A	.WORD	IC2,'SK', 'NE '
	0DED	534B	A		
	0DEE	4E45	A		
3700	0DEF	6000	A	AND	0,0
3701	0DF0	08C6	A	.WORD	IC3,'AN', 'D '
	0DF1	414E	A		
	0DF2	4420	A		
3702	0DF3	6800	A	OR	0,0
3703	0DF4	08C6	A	.WORD	IC3,'OR',
	0DF5	4F52	A		
	0DF6	2020	A		
3704	0DF7	7000	A	SKAZ	0,0
3705	0DF8	08C6	A	.WORD	IC3,'SK', 'AZ '
	0DF9	534B	A		
	0DFA	415A	A		
3706	0DFB	7800	A	ISZ	0
3707	0DFC	08C2	A	.WORD	IC4,'IS', 'Z '
	0DFD	4953	A		
	0DFE	5A20	A		
3708	0DFF	7C00	A	DSZ	0
3709	0E00	08C2	A	.WORD	IC4,'DS', 'Z '
	0E01	4453	A		
	0E02	5A20	A		
3710	0E03	3081	A	NOP	
3711	0E04	08CA	A	.WORD	IC5,'NO', 'P '
	0E05	4E4F	A		
	0E06	5020	A		
3712	0E07	0080	A	PUSHF	
3713	0E08	08CA	A	.WORD	IC5,08000+'PU', 'SH', 'F '
	0E09	D055	A		
	0E0A	5348	A		
	0E0B	4620	A		
3714	0E0C	0280	A	PULLF	
3715	0E0D	08CA	A	.WORD	IC5,08000+'PU', 'LL', 'F '
	0E0E	D055	A		
	0E0F	4C4C	A		
	0E10	4620	A		
3716	0E11	0000	A	HALT	
3717	0E12	08CA	A	.WORD	IC5,'HA', 'LT '
	0E13	4841	A		
	0E14	4C54	A		
3718	0E15	0510	A	.WORD	0510 ;ISCAN
3719	0E16	08CC	A	.WORD	IC5A,08000+'IS', 'CA', 'N '
	0E17	C953	A		
	0E18	4341	A		

IMPASM

0E19 4E20 A		
3720 0E1A 4000 A	PUSH	0
3721 0E1B 08CF A	.WORD	IC6, 'PU', 'SH'
0E1C 5055 A		
0E1D 5348 A		
3722 0E1E 4400 A	PULL	0
3723 0E1F 08CF A	.WORD	IC6, 'PU', 'LL'
0E20 5055 A		
0E21 4C4C A		
3724 0E22 5400 A	.WORD	05400
3725 0E23 08CF A	.WORD	IC6, 08000+ 'XC', 'HR', 'S'
0E24 D843 A		
0E25 4852 A		
0E26 5320 A		
3726 0E27 4800 A	AISZ	0,0
3727 0E28 08D4 A	.WORD	IC7, 'AI', 'SZ'
0E29 4149 A		
0E2A 535A A		
3728 0E2B 4C00 A	LI	0,0
3729 0E2C 08D4 A	.WORD	IC7, 'LI', ''
0E2D 4C49 A		
0E2E 2020 A		
3730 0E2F 5000 A	CAI	0,0
3731 0E30 08D4 A	.WORD	IC7, 'CA', 'I'
0E31 4341 A		
0E32 4920 A		
3732 0E33 5800 A	ROL	0,0
3733 0E34 08D4 A	.WORD	IC7, 'RO', 'L'
0E35 524F A		
0E36 4C20 A		
3734 0E37 5C00 A	SHL	0,0
3735 0E38 08D4 A	.WORD	IC7, 'SH', 'L'
0E39 5348 A		
0E3A 4C20 A		
3736 0E3B 5800 A	ROR	0,0
3737 0E3C 08DF A	.WORD	IC7A, 'RO', 'R'
0E3D 524F A		
0E3E 5220 A		
3738 0E3F 5C00 A	SHR	0,0
3739 0E40 08DF A	.WORD	IC7A, 'SH', 'R'
0E41 5348 A		
0E42 5220 A		
3740 0E43 3000 A	RADD	0,0
3741 0E44 08EC A	.WORD	IC8, 'RA', 'DD'
0E45 5241 A		
0E46 4444 A		
3742 0E47 3080 A	RXCH	0,0
3743 0E48 08EC A	.WORD	IC8, 'RX', 'CH'
0E49 5258 A		
0E4A 4348 A		
3744 0E4B 3081 A	PCPY	0,0
3745 0E4C 08EC A	.WORD	IC8, 'RC', 'PY'
0E4D 5243 A		
0E4E 5059 A		
3746 0E4F 3082 A	RXOR	0,0
3747 0E50 08EC A	.WORD	IC8, 'RX', 'OR'
0E51 5258 A		
0E52 4F52 A		
3748 0E53 3083 A	RAND	0,0
3749 0E54 08EC A	.WORD	IC8, 'RA', 'ND'
0E55 5241 A		
0E56 4E44 A		
3750 0E57 2000 A	JMP	0

IMPASM

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3751 0E58 08FB A      .WORD    IC9,'JM','P '
      0E59 4A4D A
      0E5A 5020 A
3752 0E5B 2800 A      JSR      0
3753 0E5C 08FB A      .WORD    IC9,'JS','R '
      0E5D 4A53 A
      0E5E 5220 A
3754 0E5F 0800 A      SFLG     0
3755 0E60 0908 A      .WORD    IC10,'SF','LG '
      0E61 5346 A
      0E62 4C47 A
3756 0E63 0880 A      PFLG     0
3757 0E64 0908 A      .WORD    IC10,'PF','LG '
      0E65 5046 A
      0E66 4C47 A
3758 0E67 1000 A      BOC      0,+.1
3759 0E68 0913 A      .WORD    IC11,'BO','C '
      0E69 424F A
      0E6A 4320 A
3760 0E6B 0200 A      RTS      0
3761 0E6C 0925 A      .WORD    IC12,'RT','S '
      0E6D 5254 A
      0E6E 5320 A
3762 0E6F 0400 A      RIN      0
3763 0E70 0925 A      .WORD    IC12,'RI','N '
      0E71 5249 A
      0E72 4E20 A
3764 0E73 0600 A      ROUT     0
3765 0E74 0925 A      .WORD    IC12,'RO','UT '
      0E75 524F A
      0E76 5554 A
3766 0E77 0100 A      RTI      0
3767 0E78 0925 A      .WORD    IC12,'RT','I '
      0E79 5254 A
      0E7A 4920 A
3768 0E7B 0300 A      .WORD    0300 ;JSRP
3769 0E7C 0929 A      .WORD    IC12A,'JS','RP '
      0E7D 4A53 A
      0E7E 5250 A
3770 0E7F 0520 A      .WORD    0520 ;JINT
3771 0E80 092F A      .WORD    IC13A,'JI','NT '

      0E81 4A49 A
      0E82 4E54 A
3772 0E83 0700 A      .WORD    0700 ;SETST
3773 0E84 092F A      .WORD    IC13A,08000+'SE','TS','T '
      0E85 D345 A
      0E86 5453 A
      0E87 5420 A
3774 0E88 0710 A      .WORD    0710 ;CLRST
3775 0E89 092F A      .WORD    IC13A,08000+'CL','RS','T '
      0E8A C34C A
      0E8B 5253 A
      0E8C 5420 A
3776 0E8D 0720 A      .WORD    0720 ;SETBIT
3777 0E8E 092F A      .WORD    IC13A,08000+'SE','TB','IT '
      0E8F D345 A
      0E90 5442 A
      0E91 4954 A
3778 0E92 0730 A      .WORD    0730 ;CLRBIT
3779 0E93 092F A      .WORD    IC13A,08000+'CL','RB','IT '
      0E94 C34C A
      0E95 5242 A
      0E96 4954 A

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IMPASM

3780	0E97	0750	A	.WORD	0750		;SKBIT
3781	0E98	092F	A	.WORD	IC13A,S+'SK','BI','T'		
	0E99	D34B	A				
	0E9A	4249	A				
	0E9B	5420	A				
3782	0E9C	0740	A	.WORD	0740		;SKSTF
3783	0E9D	092F	A	.WORD	IC13A,S+'SK','ST','F'		
	0E9E	D34B	A				
	0E9F	5354	A				
	0EA0	4620	A				
3784	0EA1	0760	A	.WORD	0760		;CMPBIT
3785	0EA2	092F	A	.WORD	IC13A,08000+'CM','PB','IT'		
	0EA3	C34D	A				
	0EA4	5042	A				
	0EA5	4954	A				
3786	0EA6	0500	A	.WORD	0500		;JMPP
3787	0EA7	092F	A	.WORD	IC13A,'JM','PP'		
	0EA8	4A4D	A				
	0EA9	5050	A				
3788	0EAA	0480	A	.WORD	0480		;MPY
3789	0EAB	0935	A	.WORD	IC14,'MP','Y'		
	0EAC	4050	A				
	0EAD	5920	A				
3790	0EAE	0490	A	.WORD	0490		;DIV
3791	0EAF	0935	A	.WORD	IC14,'DI','V'		
	0EB0	4449	A				
	0EB1	5620	A				
3792	0EB2	04A0	A	.WORD	04A0		;DADD
3793	0EB3	0935	A	.WORD	IC14,'DA','DD'		
	0EB4	4441	A				
	0EB5	4444	A				
3794	0EB6	04B0	A	.WORD	04B0		;DSUB
3795	0EB7	0935	A	.WORD	IC14,'DS','UB'		
	0EB8	4453	A				
	0EB9	5542	A				
3796	0EBA	04C0	A	.WORD	04C0		;LDB
3797	0EBB	0937	A	.WORD	IC15,'LD','B'		
	0EBC	4C44	A				
	0EBD	4220	A				
3798	0EBE	04D0	A	.WORD	04D0		;STB
3799	0EBF	0937	A	.WORD	IC15,'ST','B'		
	0EC0	5354	A				
	0EC1	4220	A				
3800	0EC2	04C0	A	.WORD	04C0		;LLB
3801	0EC3	0937	A	.WORD	IC15,'LL','B'		
	0EC4	4C4C	A				
	0EC5	4220	A				
3802	0EC6	04D0	A	.WORD	04D0		;SLB
3803	0EC7	0937	A	.WORD	IC15,'SL','B'		
	0EC8	534C	A				
	0EC9	4220	A				
3804	0ECA	04C0	A	.WORD	04C0		;LRB
3805	0ECB	093A	A	.WORD	IC16,'LR','B'		
	0ECC	4C52	A				
	0ECD	4220	A				
3806	0ECE	04D0	A	.WORD	04D0		;SRB
3807	0ECF	093A	A	.WORD	IC16,'SR','B'		
	0ED0	5352	A				
	0ED1	4220	A				
3808	0ED2	0380	A	.WORD	0380		;JSRI
3809	0ED3	0941	A	.WORD	IC17,'JS','RI'		;JSRI
	0ED4	4A53	A				
	0ED5	5249	A				

IMPASM

```

3810 0ED6      DITBL2:
3811 0ED6      ;      END IF IMP 16 ASSEMBLER
3812 0ED6      ;
3813 0ED6      BADSTB:
3814 0ED6      .ENDIF
3815 0ED6      STBAS:
3816 0ED6 02B0 A      .END      START
      0098 0427 A
      0099 0ADB A
      009A 0BD3 A
      009B 0CFA A
      009C 0C19 A
      009D 0651 A
      009E 0199 A
      009F 01D9 A
      00A0 01E1 A
      00A1 01DA A
      00A2 01DE A

      00A3 01DF A
      00A4 01E0 A
      00A5 0AC3 A
      00A6 0438 A
      00A7 0D18 A
      00A8 0AD4 A
      00A9 0170 A
      00AA 0406 A
      00AB 0407 A
      00AC 0C60 A
      00AD 0D55 A
      00AE 0A56 A
      00AF 0AFB A
      00B0 0B05 A
      00B1 0A7C A
      00B2 0BAA A
      00B3 06E7 A
      00B4 0571 A
      00B5 058D A
      00B6 0CDC A
      00B7 05AC A
      00B8 06F5 A
      00B9 07A0 A
      00BA 0C7D A
      00BB 05C2 A
      00BC 04BD A
      00BD 0A84 A
      00BE 044A A
      00BF 07F5 A
      00C0 031B A
      00C1 07F7 A
      00C2 0454 A
      00C3 0CBC A
      00C4 01DD A
      00C5 01DC A
      00C6 0C96 A
      00C7 07F3 A
      00C8 034C A
      00C9 0AD5 A
      00CA 0CE9 A
      00CB 046C A
      00CC 0ADC A
      00CD 0A96 A
      00CE 02E5 A
      00CF 0AA6 A

```

IMPASM

```
00D0 0A03 A
00D1 0A20 A
00D2 0A8E A
00D3 0347 A
00D4 06D4 A
00D5 0342 A
00D6 034A A
```

```
00D7 07B7 A
00D8 07E1 A
00D9 0AE7 A
00DA 0A23 A
00DB 033F A
00DC 0359 A
00DD 0CE3 A
00DE 0340 A
00DF 0743 A
00E0 0CE6 A
00E1 0C29 A
00E2 07E4 A
00E3 0343 A
00E4 0C26 A
00E5 0AAB A
00E6 0AA8 A
00E7 0AAA A
00E8 0A2C A
00E9 0970 A
00EA 0983 A
00EB 0982 A
00EC 0345 A
00ED 0A2A A
00EE 0344 A
00EF 0975 A
00F0 0A28 A
00F1 0979 A
00F2 0A2E A
00F3 0A32 A
00F4 0A30 A
00F5 0A06 A
00F6 0924 A
00F7 0B7F A
```

***** 0 ERRORS IN ASSEMBLY *****

```
$1&    $1'    $1(    $1)    $1*    $1+    $1,    $1-    $1.    $1/
0482 A 04A7 A 04CB A 050E A 0555 A 05A6 A 05CF A 0688 A 06EE A 074D A

$10(    $10+    $10.    $10/    $100-    $1007    $101    $1027    $1037    $104
04F9 A 05A3 A 073D A 078C A 0685 A 0B1A A 07E0 A 0B07 A 0B10 A 09FE A

$1047    $109    $10=    $10A9    $10B9    $11    $11(    $11,    $11.    $111
0B39 A 0BB8 A 0D33 A 0BCE A 0BBA A 07DE A 04F6 A 061D A 073E A 07EF A

$1113    $113    $11=    $11B9    $11C9    $12    $12(    $12,    $12.    $121
0921 A 08B3 A 0D39 A 0BF1 A 0BC6 A 087B A 04F1 A 061E A 0740 A 07ED A

$123    $129    $12A9    $12B9    $13,    $14,    $15    $15,    $16    $18
08B6 A 0BD6 A 0BDE A 0BDA A 0608 A 0605 A 0A45 A 05FA A 0A63 A 0B82 A

$19    $1;    $1<    $1=    $1>    $1A(    $1A,    $2"    $2(    $2)
0C1A A 0CE2 A 0D08 A 0D21 A 0D6D A 04D1 A 05D9 A 02CB A 04D7 A 0503 A

$2*    $2+    $2-    $2.    $2/    $20    $20+    $20,    $2007    $21
055D A 05B8 A 068A A 06F5 A 076E A 07A3 A 057A A 062F A 0B37 A 07BE A
```

IMPASM

\$213	\$21:	\$22	\$22:	\$24	\$25	\$28	\$29	\$2;	\$2=
08BE A	0C87 A	088F A	0C81 A	09AA A	0A3C A	0BA5 A	0C2B A	0CE5 A	0D22 A
\$2>	\$2A/	\$2A1	\$2A2	\$2B0	\$2B2	\$3"	\$3(	\$3)	\$3*
0D6D A	0773 A	07BC A	0893 A	07AA A	0898 A	02DB A	04D6 A	0505 A	0562 A
\$3+	\$3-	\$3.	\$3/	\$30	\$30,	\$30-	\$3002	\$30:	\$31
05BA A	068B A	06F8 A	0751 A	07AE A	064F A	067D A	080F A	0CB2 A	07CD A
\$31:	\$32	\$33:	\$34	\$35	\$36	\$38	\$39	\$3=	\$3>
0CB4 A	08A6 A	0CA0 A	09AE A	0A4E A	0A71 A	0B8E A	0C2E A	0D1B A	0D59 A
\$3A2	\$4(	\$4)	\$4*	\$4-	\$4.	\$4/	\$40	\$41	\$413
081F A	04D9 A	050A A	055E A	0692 A	0712 A	0755 A	07AF A	07C9 A	08C3 A
\$45	\$48	\$4=	\$4A.	\$4B.	\$5(	\$5*	\$5+	\$50%	\$504
0A21 A	0B98 A	0D29 A	071B A	0717 A	04E3 A	0567 A	05A4 A	03C4 A	0A0B A
\$509	\$51	\$51%	\$514	\$519	\$52	\$524	\$529	\$55	\$58
0BB7 A	07C0 A	03A3 A	0A0F A	0C4C A	0828 A	0A17 A	0C4D A	0A24 A	0B8A A
\$5A\$	\$6(	\$6+	\$6/	\$60;	\$61	\$619	\$61;	\$62	\$68
0376 A	04E8 A	05BC A	076A A	0CF5 A	07D2 A	0BAF A	0CF2 A	0841 A	0B9C A
\$7+	\$7/	\$71	\$72	\$78	\$8/	\$803	\$81	\$88	\$9/
057D A	076C A	07C4 A	08A1 A	0B91 A	0784 A	08F8 A	07D9 A	0B87 A	0774 A
\$91	\$913	\$923	\$ABS14	\$ABS4	\$ADR4	\$ADRO4	\$AERR4	\$AND,	\$APEN/
07D7 A	0900 A	0903 A	09A5 A	099A A	0984 A	09AD A	09D0 A	062C A	0758 A
\$APPE/	\$RKSP9	\$BLNK*	\$BS0-	\$BSEC4	\$BSPR-	\$BYP1)	\$CB\$	\$CBZ2	\$CI4
0758 A	0C12 A	0560 A	06D1 A	09FB A	0677 A	0523 A	033E A	0850 A	0A1F A
\$CK+	\$COM,	\$CONV2	\$CT2	\$CTAB=	\$DEC-	\$DEF4	\$DIV,	\$DL.	\$DOT\$
0586 A	0635 A	0849 A	085C A	0D3B A	06A2 A	0991 A	0626 A	0720 A	0365 A
\$DOT-	\$DT.	\$E1>	\$EB%	\$EERR,	\$EL%	\$ELOK&	\$END1	\$ENDB:	\$EQPG6
06C6 A	071F A	0D82 A	0401 A	05F9 A	03D1 A	0494 A	07F2 A	0CBB A	0AF0 A
\$EQTT6	\$ERET4	\$ERR-	\$ERRM>	\$EX0,	\$EXPN,	\$EXPN5	\$EXT4	\$FIN,	\$FIN1%
0AF1 A	09C7 A	06CE A	0D70 A	0640 A	0636 A	0A35 A	09FB A	063C A	03FA A
\$FINI%	\$FLAG2	\$FLAG5	\$FO2	\$GAN.	\$GC9	\$GDEC"	\$GL.	\$GL1.	\$GLBN2
03FA A	0860 A	0A55 A	085D A	0735 A	0BD8 A	02DD A	072A A	072B A	0859 A
\$GNAM=	\$GP.	\$GP1.	\$GR.	\$GS1.	\$GS2.	\$HEX-	\$IBEN8	\$IBL9	\$IFLA4
0D2E A	0721 A	0722 A	0730 A	06E4 A	06D7 A	066D A	0BA9 A	0C28 A	0A01 A
\$IOK14	\$IOK24	\$IOK34	\$IOK4	\$IOK44	\$IOK54	\$IOK64	\$IPTR8	\$LAST2	\$LF9
09F4 A	09EA A	09E6 A	09D6 A	09EF A	09DF A	09F8 A	0BA8 A	07FA A	0C17 A
\$LONG2	\$LOOP2	\$LOOW6	\$LP4	\$MAIN%	\$MAN16	\$MASK5	\$MERR4	\$MERR<	\$MG2
088D A	0809 A	0A78 A	09BA A	033A A	0AD0 A	0A54 A	09D3 A	0D16 A	0861 A
\$MIN1-	\$MINU,	\$MINU-	\$MPY,	\$MPY1,	\$NAME-	\$NERR&	\$NEXT2	\$NK29	\$NLCL2
0698 A	05FE A	0697 A	0620 A	0624 A	06B6 A	0491 A	085A A	0C58 A	0877 A
\$NO%	\$NOEX&	\$NOPR9	\$NOT-	\$NOUN-	\$NOX3	\$NP%	\$NXT,	\$NXTA/	\$NXTB/
03E0 A	048B A	0BB8 A	0695 A	067E A	0968 A	041D A	05D7 A	079C A	079D A
\$O1X16	\$O1X26	\$O1X36	\$O1X6	\$OE%	\$OP,	\$OR,	\$OR:	\$OV&	\$PGEF)
0A9A A	0AA2 A	0AA0 A	0A99 A	03E4 A	05F0 A	0631 A	0C89 A	0488 A	0538 A

IMPASM

```

$PLUS, $PMRE, $PRM9 $PRMP> $PROM9 $PT2 $PTR* $PTR1* $PTRL* $PUT16
05F1 A 0612 A 0BB2 A 0D84 A 0BD2 A 085B A 056E A 056F A 0570 A 0AB0 A

$PUT26 $PUT36 $QNXT/ $QUOT- $REL, $REL3 $REL6 $RELT6 $REND/ $RET1-
0AB6 A 0AB4 A 079E A 069E A 0644 A 096F A 0A83 A 0A79 A 078E A 0678 A

$RET6 $RETC9 $RM2 $ROV/ $RSER/ $RTB2 $SAME' $SERC$ $SETB/ $SORF.
0AC2 A 0C24 A 085E A 0788 A 074A A 085F A 04C4 A 036D A 0794 A 06E6 A

$STR12 $STRT2 $SYRE- $T0. $T0< $T1) $T1. $TAB19 $TAB9 $TEMP6
07FD A 07F8 A 06C9 A 0728 A 0D12 A 0537 A 0729 A 0C03 A 0BFA A 0AA4 A

$TEST- $TMP" $TMP% $TMP' $TMP7 $TMP: $TR2> $TRYI4 $TSEC4 $TTL#
0658 A 02E2 A 03DF A 04C7 A 0B3C A 0CC6 A 0D83 A 09CE A 09CB A 031A A

$TTL% $SUM- $UNOT- $UOP- $VAL3 $VERR4 $WORD1 $WRD6 $X- $X203%
0400 A 0681 A 067C A 0684 A 096E A 09C5 A 07F1 A 0A82 A 06B1 A 0378 A

$XARG$ $XERR, $XERR3 $XFLA4 $XOK4 ABST ACTR ADRERR AMAX ASCII
033D A 060F A 097D A 0A02 A 09B4 A 0021 B 0056 B 0977 A 0059 B 04EE A

ASECT ASMDIR ASSIGN BLEQ1 BADSTB BASE BASEA BASEB BCTR BEGP34
04A6 A 0539 A 058D A 0004 A 0ED6 A 0060 B 0063 B 0066 B 0057 B 03BA A

BLANK BLANKS BLDDIR BLDNAM BMAX BSECT CAND CAT CDIV CHARX
0034 B 0048 B 06F5 A 06E7 A 005A B 04B5 A 0053 B 0032 B 0035 B 0044 B

CKPNCH CLOSEO CLOSET CMINUS CMPY CNAM0 CNAM1 CNOT COLAN COMMA
0C96 A 001D B 001C B 0051 B 003C B 0080 B 0081 B 0052 B 004B B 004F B

COR CPLUS CR CZERO DBGVER DBWIN DIREND DISER DITBL2 DITBLB
0054 B 0050 B 0047 B 0038 B 0000 A 0950 A 0347 A 07A0 A 0ED6 A 0D85 A

DITBLF DITBL2 DIVD DOLLAR DOT DOTASN DSKERR DSKIN DSKOBJ DSKTMP
07B6 A 07B5 A 000E B 004E B 004A B 05AC A 0D17 A 001F B 001E B 0020 B

EC ECHOGC ELIM ELSE END ENDBUF ENDIF ENDP1 ENDP2 ENDP3
0088 B 0014 B 0008 A 048E A 0379 A 0402 A 049B A 0395 A 03B1 A 03E3 A

ENDP4 ENDPCH ENDST EQUAL ERBUF ERBAS ERLST ERRMSG ERROR ERRPT
03FB A 0CB8 A 034A A 004C B 0D71 A 0055 B 008F B 0B3D A 0D55 A 008B B

ERRST EXP EXP4 EXP8 EXPABS EXPFRM EXPP EXPP1 EXPP2 EXPP3
0342 A 05C2 A 0A26 A 0A28 A 0A20 A 0A34 A 0A23 A 0A2A A 0A2C A 0A2E A

EXPP4 EXPP7 EXPPD EXPREL EXPVAL EXT D FORMB FORMBN FORMM FORMPT
0A30 A 0A32 A 007B B 007C B 007A B 04B9 A 0075 B 0078 B 0077 B 0074 B

FORMT FORMTN GADR GADRI GADRIX GADRX GCOMMA GCSTRG GETC GFORM
0076 B 0079 B 097F A 0980 A 0983 A 0982 A 0CFA A 07E1 A 000F B 06D6 A

GITEM GLBUF GLOBL GNC GNCVC GNSTRG GNVC GSIZE GSTCON GSYM
0651 A 0863 A 04C8 A 0C26 A 0C29 A 07B7 A 0C19 A 02CE A 07E4 A 06D4 A

HEX20 HEX2A HEX2F HEX30 HEX37 HEX39 HEX3F HEX40 HEX400 HEX46
0034 B 003C B 0035 B 0038 B 0039 B 0036 B 003B B 0032 B 003D B 0037 B

HEX5A HEX5F HEX760 HEX7D HEX7F HEXD0A HSPR HSPRT IC1 IC10
0033 B 0C15 A 02E3 A 0C16 A 003A B 0AA5 A 0096 B 001A B 08A7 A 0908 A

IC11 IC12 IC12A IC13 IC13A IC14 IC15 IC16 IC16A IC17
0913 A 0925 A 0929 A 0931 A 092F A 0935 A 0937 A 093A A 093D A 0941 A

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IMPASM

IC2	IC3	IC4	IC5	IC5A	IC6	IC7	IC7A	IC8	IC9
08BB A	08C6 A	08C2 A	08CA A	08CC A	08CF A	08D4 A	08DF A	08EC A	08FB A
ICLASS	IDSKIN	IDSKTM	IF	IFBYP	IFMODE	IFPTR	IFPTRA	IFSKIP	IFSTAT
0073 B	0094 B	0095 B	0474 A	0CDC A	0070 B	006D B	006E B	0CDF A	006F B
IFTAB	IFTBL	INABS	INBUF	INBUFB	INBUFE	INDEV	INERR	INERR1	INITOR
018F A	04A5 A	0344 A	0120 A	0012 B	0013 B	0089 B	0970 A	0971 A	0C60 A
INOUT	INPTR	IREL	ITREL	ITVAL	IVAL	K1	K11	K15	K16
0345 A	005E B	0924 A	0087 B	0086 B	0072 B	0026 B	0025 B	002D B	0041 B
K2	K255	K256	K3	K4	K6	K639	K7	K8	K9
0040 B	0024 B	003F B	0027 B	002C B	0028 B	0D2D A	002A B	0029 B	002B B
KM129	KM41	KM57	KM65	LABEL	LABST	LBLPT	LCNT1	LCNT2	LCNT2A
0A05 A	0C0F A	0C10 A	0C11 A	0571 A	02E4 A	008A B	008C B	008D B	0C18 A
LCPTR	LEAD	LEAD8	LEZ	LINIT	LIST	LISTMD	LOCAL	LOCCTR	LOCREG
005F B	0CBC A	0CBF A	000B A	0015 B	0527 A	008E B	04DB A	005C B	006C B
LPAREN	MANYNL	MAPLIN	MAXR1	MERROR	MESS	MOFLAG	MSGBEG	MSGEP	MSGNOE
0046 B	0AC3 A	086A A	04BD A	0979 A	001B B	006A B	0427 A	0445 A	046C A
MSGNXT	MSGOCK	MSGP	MSGSOV	MSGTAB	MSGTO	MULT	NAM0	NAM1	NAM2
0438 A	0465 A	044A A	044C A	0B42 A	0454 A	000D B	007D B	007E B	007F B
NEWASM	NEWLIN	NEXT	NEXTA	NEXTB	NEXTLB	NEXTST	NOCOM	NOLIST	NOMAP
02E5 A	0AD4 A	0062 B	0065 B	0068 B	0359 A	034C A	0092 B	0091 B	0093 B
NZ	O12B	O1B	O1CH	O2B	O2CH	O4B	O6B	OBJCK	OBJMOD
0005 A	0ABE A	0AAA A	0AAB A	0AA8 A	0AD5 A	0AA7 A	0AA6 A	0407 A	0090 B
OBJPT1	OBJPT2	OBJPTR	OBJREC	ODD	OEPM	OGLOB	OHEX	OHEXIF	OIBREP
0CDA A	0CDB A	0CD9 A	0CC7 A	0003 A	0408 A	07F3 A	0A96 A	0A8E A	0AFB A
OIBUF	OLAST	OMAP	OMAPNR	OMSG	ONLMSG	OOREC	OOWORD	OPGSTR	OPTRS
0B7F A	03E2 A	07F7 A	07FB A	0ADC A	0ADB A	0C7D A	0C6F A	0AE7 A	0414 A
OSPDEC	OUTWRD	OVAL	P	PIP2	P2P1	PAGE	PASS	PGR1	PGSTRG
0CE9 A	0A56 A	0A84 A	0002 A	0CE6 A	0CE3 A	04FC A	005D B	0071 B	0170 A
PINIT	PNCHMD	PR2PTR	PRCTRL	PREPLB	PRMPT1	PRMPT2	PROMPT	PTABF	PTABL
031B A	000C A	0AFA A	0D18 A	05BE A	0C37 A	0C35 A	0C3E A	0A03 A	0A04 A
PTREND	PTRTAB	PUTC	QERROR	QUOTE	R0	R1	R2	R3	RDCRD
01DA A	0199 A	0010 B	0975 A	0045 B	0000 A	0001 A	0002 A	0003 A	0011 B
RDSKIN	RDSKTM	RDTTY	READ	RELTB	REPERR	RESETP	RPAREN	S	SCANST
0018 B	0019 B	0BD3 A	0BAA A	0A79 A	0B05 A	07F5 A	0043 B	0000 A	0E08 A
SECT	SEMI	SHIFT	SHLIN	SIZE4	SIZE8	SOUCK	SPACE	SPADR	STAFT
006B B	0049 B	0C8A A	004D B	0001 A	FFFF A	0406 A	0513 A	0A06 A	02B0 A
STBAS	STPDEF	STPT	STREL	STSER	STTOP	STVAL	TCTR	TITLE	TLAST
0ED6 A	0083 B	0085 B	0084 B	0743 A	0FFF A	0082 B	0058 B	053D A	03E1 A
TMAX	TOP	TOPA	TOPB	TSECT	TTLBUF	TYPMOD	VERROR	WDSKOB	WDSKTM
005B B	0061 B	0064 B	0067 B	04B7 A	01DA A	0097 B	097B A	0017 B	0016 B

IMPASM

WORD WORD3 WORD4 WORD5 WORD6 X1000 X2020 X2031 X6666 X8000
04E5 A 0CC9 A 0CCA A 0CCB A 0CCC A 003E B 0858 A 03FF A 0031 B 0030 B

X8004 XARGCK XERR1 XERROR XF000 XFF00 XFFF0 XFFF7 XFFFB XINOK
0C6E A 0AF2 A 0340 A 033F A 06D3 A 0042 B 002E B 002F B 079F A 0069 B

Z ZERO
0001 A 0023 B

EB4E 8B8E

CRD16P

CRD16P

REVISION-G 05/16/74
CRD16P 00313C 7/12/74

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1 0000 .TITLE CRD16P,'00313C 7/12/74'
2 0000 ;
3 0000 ; THIS IS AN ABSOLUTE LOADER FOR THE IMP-16P SYSTEM
4 0000 ;
5 0000 ; THIS PROGRAM READS RLM(S) FROM THE CARD READER AND
6 0000 ; LOADS THE DATA INTO MEMORY. THE CARDS MUST HAVE BEEN
7 0000 ; PUNCHED INTO CARD COLUMNS 1-72, AND CAN CONTAIN PUNCH
8 0000 ; CODES ONLY FOR THE CHARACTERS 0,1,...,9,A,B,...,F, OR
9 0000 ; BLANK. BLANKS WILL BE TREATED AS 0.
10 0000 ;
11 0000 ; RLM(S) MUST BE IN STANDARD RLM FORMAT. TITLE CARDS
12 0000 ; AND SYMBOL CARDS ARE IGNORED. DATA FROM DATA CARDS IS
13 0000 ; MOVED TO THE SPECIFIED LOAD LOCATIONS WITHOUT ANY
14 0000 ; RELOCATION PERFORMED. AT LEAST ONE END CARD MUST
15 0000 ; CONTAIN AN ENTRY POINT ADDRESS (SEE ERROR CODE 5, BELOW).
16 0000 ; THE ORDER OF THE INPUT CARDS IS UNIMPORTANT.
17 0000 ;
18 0000 ; A CHECKSUM TEST IS PERFORMED ON ALL DATA CARDS. (SEE
19 0000 ; ERROR CODE 3, BELOW.)
20 0000 ;
21 0000 ; THERE ARE NO RESTRICTIONS ON THE ADDRESSES THAT MAY BE
22 0000 ; LOADED, SINCE NO MAIN MEMORY IS USED BY THIS PROGRAM.
23 0000 ;
24 0000 ; THE DECK(S) TO BE LOADED MUST BE FOLLOWED BY A '!GO' CARD
25 0000 ; (EXCLAMATION-POINT IN COLUMN 1; 'G' IN COLUMN 2).
26 0000 ; EXECUTION WILL BEGIN AT THE LAST NON-ZERO ENTRY POINT.
27 0000 ;
28 0000 ;
29 0000 ;
30 0000 ;
31 0000 ;
32 0000 ;
33 0000 ;
34 0000 ;
35 0000 ;
36 0000 ;
37 0000 ;
38 0000 ;
39 0000 ;
40 0000 ;
41 0000 ;
42 0000 ;
43 0000 ;
44 0000 ;
45 0000 ;
46 0000 ;
47 0000 ;
48 0000 ;
49 0000 ;
50 0000 ;
51 0000 ;
52 0000 ;
53 0000 ;
54 0000 ;
55 0000 7F00 A ;
56 7F00 ;
57 7F00 ;
58 7F00 ;
59 7F00 0000 A AC0 = 0

```

ERROR	MEANING	ACTION
1	I/O ERROR	REPLACE CARD IN READER AND PUSH STAR
2	INV. CHARACTER	CORRECT CARD, REPLACE IN READER, AND PUSH START. THE INVALID HOLLERIT CODE IS IN AC1. (ONLY CODES 0,...,F AND BLANK ARE ALLOWED.)
3	CHECKSUM ERROR	CORRECT CARD, REPLACE IN READER, AND PUSH START.
5	INV. ENTRY POINT	SET CORRECT ENTRY POINT INTO AC1 AND PUSH START.

ALL ERROR CODES ARE LOADED INTO AC0 BEFORE HALTING.

THIS PROGRAM FITS INTO 2 8X256-BIT PROMS ON THE
IMP-16P CARD READER/TELETYPE INTERFACE CARD:

IMP NUMBER	PROM NUMBER	ROM NUMBER	BOARD CO-ORDINATE
IMP-16F/004A	4600313C	4100313C	4G
IMP-16F/004B	4610313C	4110313C	6G

.PAGE 'ABSCR ROUTINE - IMP-16P'

.ASECT
.=07F00 ; STARTING ADDRESS = 7F00

DEFINITIONS

= 0

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60 7F00 0001 A AC1      =      1
61 7F00 0002 A AC2      =      2
62 7F00 0003 A AC3      =      3
63 7F00                ;
64 7F00 0001 A ZRO       =      1      ; AC0 = 0
65 7F00 0003 A BIT0      =      3      ; AC0(0) = 1
66 7F00 0004 A BIT1      =      4      ; AC0(1) = 1
67 7F00 0005 A NZRO      =      5      ; AC0 ~= 0
68 7F00 000B A RLE0      =     11      ; AC0 <= 0
69 7F00                ;
70 7F00 0010 A CRADR     =     2*8      ; CARD READER ADDRESS
71 7F00 0001 A READ      =      1      ; READ DATA
72 7F00 0002 A PICK      =      2      ; PICK COMMAND
73 7F00 0003 A RESET     =      3      ; RESET PICK & INDEX MARK FLIP-FLOPS
74 7F00                .PAGE
75 7F00 4C00 A ABSCR:    LI      AC0,0      ; SET ENTRY POINT
76 7F01 4000 A          PUSH     AC0
77 7F02 4F10 A FIRST:    LI      AC3,CRADR    ; READ A NEW CARD
78 7F03 0603 A          ROUT     RESET      ; BE SURE INDEX MARK IS RESET
79 7F04 0602 A          ROUT     PICK       ; GET CARD
80 7F05 4E50 A          LI      AC2,80      ; SET COLUMN COUNTER
81 7F06 2924 A          JSR      RDCOL      ; GET DATA
82 7F07 F521 A          SKNE     AC1,EXCLAM   ; CHECK FOR COMMAND CARD
83 7F08 2107 A          JMP      COMMAND
84 7F09 150A A          BOC      NZRO,IGNORE  ; IGNORE REST OF CARD IF ERROR
85 7F0A 3481 A          RCPY     AC1,AC0
86 7F0B 5CFE A          SHR      AC0,2      ; CHECK RECORD TYPE
87 7F0C 1401 A          BOC      BIT1,..+2
88 7F0D 2103 A          JMP      SKIP       ; IGNORE TITLE & SYMBOL RECORDS
89 7F0E 136A A          BOC      BIT0,GOEND   ; PROCESS END RECORD
90 7F0F 216A A          JMP      GODATA      ; PROCESS DATA RECORD
91 7F10                ;
92 7F10 291A A COMMAND:JSR RDCOL          ; COMMAND: CHECK 2ND COLUMN
93 7F11 4C00 A SKIP:     LI      AC0,0      ; NO ERROR FOR COMMAND/TITLE/SYMBOL CARD
94 7F12 F517 A          SKNE     AC1,G      ; CHECK FOR '!G' (GO CARD)
95 7F13 4C06 A          LI      AC0,6      ; SET FLAG 6 TO SIGNIFY GO CARD
96 7F14                ;
97 7F14 4000 A IGNORE:   PUSH     AC0      ; SAVE CARD STATUS
98 7F15 4100 A          PUSH     AC1
99 7F16 2914 A          JSR      RDCOL      ; READ REST OF COLUMNS
100 7F17 4A00 A          AISZ     AC2,0
101 7F18 21FD A          JMP      .-2      ; LOOP UNTIL DONE
102 7F19 4500 A          PULL     AC1      ; DONE: RECOVER STATUS
103 7F1A 4400 A          PULL     AC0
104 7F1B 11E6 A          BOC      ZRO,FIRST   ; GO TO NEXT CARD IF NO FLAGS SET
105 7F1C F101 A          SKNE     AC0,SIX
106 7F1D 2102 A          JMP      GO        ; GO COMMAND
107 7F1E 0006 A SIX:     HALT     6        ; HALT IF ERROR: CODE IN AC0
108 7F1F 21E2 A          JMP      FIRST
109 7F20 4400 A GO:      PULL     AC0      ; RECOVER ENTRY POINT
110 7F21 3281 A          RCPY     AC0,AC2
111 7F22 4F01 A          LI      AC3,1      ; SIGNAL INPUT DEVICE IS CARDREADER
112 7F23 1101 A          BOC      ZRO,..+2   ; CHECK FOR PROPER ENTRY POINT
113 7F24 2200 A          JMP      (AC2)      ; GO!
114 7F25 4C05 A          LI      AC0,5      ; INVALID ENTRY POINT: ERROR 5
115 7F26 0000 A ZERO:    HALT
116 7F27 3481 A          RCPY     AC1,AC0
117 7F28 21F8 A          JMP      GO+1
118 7F29                ;
119 7F29 4820 A EXCLAM:   .WORD    004820   ; EXCLAMATION POINT
120 7F2A 8040 A G:       .WORD    008040
121 7F2B                .PAGE
122 7F2B                ;

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123 7F2B      ;          RDCOL - READ AND CONVERT A SINGLE COLUMN
124 7F2B      ;
125 7F2B      ; REGISTER USAGE:
126 7F2B      ;
127 7F2B      ;          AC0      STATUS ON EXIT (0 IS NORMAL)
128 7F2B      ;          AC1      DATA (BINARY IF NO ERROR; OTHERWISE UNCONVERTED)
129 7F2B      ;          AC2      DECREMENTED COUNTER
130 7F2B      ;          AC3      UNALTERED
131 7F2B      ;
132 7F2B      ;
133 7F2B 4300 A RDCOL: PUSH      AC3
134 7F2C 4F10 A      LI          AC3,CRADR
135 7F2D 0401 A $STRT: RIN      READ          ; GET DATA
136 7F2E 1401 A      BOC      BIT1,+.2      ; LOOP UNTIL READY
137 7F2F 21FD A      JMP      $STRT
138 7F30 1307 A      BOC      BIT0,$COL      ; TEST FOR INDEX MARK
139 7F31 714A A      SKAZ      AC0,HC      ; TEST FOR HOPPER/MOTION CHECK
140 7F32 2101 A      JMP      $MOTERR
141 7F33 21F9 A      JMP      $STRT
142 7F34 3181 A $MOTERR: RCPY    AC0,AC1      ; I/O ERROR STATUS IN AC1
143 7F35 4C01 A      LI          AC0,1      ; ERROR CODE 1
144 7F36 4E01 A      LI          AC2,1      ; SIGNAL END OF CARD IF I/O ERROR
145 7F37 2102 A      JMP      $DONE
146 7F38 5CFC A $COL:  SHR      AC0,4      ; STRIP STATUS BITS
147 7F39 2905 A      JSR      CVT          ; CONVERT TO BINARY
148 7F3A 0603 A $DONE: ROUT      RESET      ; CLEAR FLIP-FLOPS
149 7F3B 4700 A      PULL      AC3          ; RESTORE AC3
150 7F3C 4AFF A      AISZ      AC2,-1      ; DECREMENT THE COUNTER
151 7F3D 2100 A      JMP      .+1
152 7F3E 0200 A      RTS          0          ; RETURN
153 7F3F      .PAGE
154 7F3F      ;
155 7F3F      ; CVT - CONVERT HOLLERITH TO HEX
156 7F3F      ;
157 7F3F      ; ON ENTRY: AC0 HAS HOLLERITH
158 7F3F      ; ON EXIT: AC0 HAS STATUS (0 = NORMAL; 2 = INVALID CHARACTER)
159 7F3F      ;          AC1 HAS DATA (BINARY; UNCONVERTED IF ERROR)
160 7F3F      ;
161 7F3F 4D00 A CVT:  LI          AC1,0      ; PRESET VALUE
162 7F40 1122 A      BOC      ZRO,BLANK      ; CHECK FOR BLANK COLUMN
163 7F41 F127 A      SKNE      AC0,TBL      ; CONVERT HEX TO BINARY
164 7F42 2120 A      JMP      BLANK
165 7F43 F126 A      SKNE      AC0,TBL+1
166 7F44 4D01 A      LI          AC1,1
167 7F45 F125 A      SKNE      AC0,TBL+2
168 7F46 4D02 A      LI          AC1,2
169 7F47 F124 A      SKNE      AC0,TBL+3
170 7F48 4D03 A      LI          AC1,3
171 7F49 F123 A      SKNE      AC0,TBL+4
172 7F4A 4D04 A      LI          AC1,4
173 7F4B F122 A      SKNE      AC0,TBL+5
174 7F4C 4D05 A      LI          AC1,5
175 7F4D F121 A      SKNE      AC0,TBL+6
176 7F4E 4D06 A      LI          AC1,6
177 7F4F F120 A      SKNE      AC0,TBL+7
178 7F50 4D07 A      LI          AC1,7
179 7F51 F11F A      SKNE      AC0,TBL+8
180 7F52 4D08 A      LI          AC1,8
181 7F53 F11E A      SKNE      AC0,TBL+9
182 7F54 4D09 A      LI          AC1,9
183 7F55 F11D A      SKNE      AC0,TBL+10
184 7F56 4D0A A      LI          AC1,10
185 7F57 F11C A      SKNE      AC0,TBL+11

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186 7F58 4D0B A      LI      AC1,11
187 7F59 F11B A      SKNE     AC0,TBL+12
188 7F5A 4D0C A      LI      AC1,12
189 7F5B F11A A      SKNE     AC0,TBL+13
190 7F5C 4D0D A      LI      AC1,13
191 7F5D F119 A      SKNE     AC0,TBL+14
192 7F5E 4D0E A      LI      AC1,14
193 7F5F F118 A      SKNE     AC0,TBL+15
194 7F60 4D0F A      LI      AC1,15
195 7F61 F5C4 A      SKNE     AC1,ZERO      ; WAS CONVERSION ACCOMPLISHED?
196 7F62 2102 A      JMP      INVCAR      ; NO - INVALID CHARACTER
197 7F63 4C00 A BLANK: LI      AC0,0      ; GOOD CONVERSION: CLEAR STATUS
198 7F64 0200 A      RTS      0
199 7F65 3181 A INVCAR: RCPY     AC0,AC1      ; PUT UNCONVERTED INVALID CHAR INTO AC1
200 7F66 5D04 A      SHL      AC1,4      ; HOLLERITH WILL BE BITS 4-15
201 7F67 4C02 A      LI      AC0,2      ; SET ERROR CODE 2
202 7F68 0200 A      RTS      0      ; RETURN
203 7F69          ;
204 7F69          ;
205 7F69          ;
206 7F69 0200 A TBL:   .WORD     0200,0100,0080,0040,0020
      7F6A 0100 A
      7F6B 0080 A
      7F6C 0040 A
      7F6D 0020 A
207 7F6E 0010 A      .WORD     0010,0008,0004,0002,0001
      7F6F 0008 A
      7F70 0004 A
      7F71 0002 A
      7F72 0001 A
208 7F73 0900 A      .WORD     0900,0880,0840,0820,0810,0808
      7F74 0880 A
      7F75 0840 A
      7F76 0820 A
      7F77 0810 A
      7F78 0808 A
209 7F79          ;
210 7F79 211A A GOEND: JMP      END      ; THESE ARE FOR LONG JUMPS
211 7F7A 212A A GODATA: JMP     DATA
212 7F7B 2198 A LAST:  JMP     IGNORE
213 7F7C 000C A HC:    .WORD     0C
214 7F7D          .PAGE
215 7F7D          .LOCAL
216 7F7D          ;
217 7F7D          ; RDWD - READ AND CONVERT A 16-BIT WORD
218 7F7D          ;
219 7F7D          ; REGISTER USAGE:
220 7F7D          ;
221 7F7D          ; AC0      STATUS ON EXIT (0 IS NORMAL)
222 7F7D          ; AC1      DATA
223 7F7D          ; AC2      DECREMENTED COUNTER
224 7F7D          ; AC3      UNALTERED
225 7F7D          ;
226 7F7D          ; RETURN:
227 7F7D          ;
228 7F7D          ; RTS 0    ERROR (AC0 HAS STATUS)
229 7F7D          ; RTS 1    NORMAL RETURN
230 7F7D          ;
231 7F7D          ;
232 7F7D 4C04 A RDWD:  LI      AC0,4      ; SET 4-COL COUNTER
233 7F7E 4D00 A RD1:  LI      AC1,0
234 7F7F 4100 A      PUSH     AC1      ; SAVE TEMP
235 7F80 4000 A MORE: PUSH     AC0      ; SAVE COUNTER

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236 7F81 29A9 A      JSR      RDCOL      ; READ A COLUMN
237 7F82 150A A      BOC      NZRO,$ERR
238 7F83 4400 A      PULL     AC0
239 7F84 5400 A      XCHRS    AC0      ; GET TEMP
240 7F85 5C04 A      SHL      AC0,4
241 7F86 3482 A      RXOR     AC1,AC0   ; MERGE 4 BITS
242 7F87 5400 A      XCHRS    AC0
243 7F88 48FF A      AISZ     AC0,-1    ; DECREMENT COUNTER
244 7F89 21F6 A      JMP      MORE     ; LOOP FOR 4 COLUMNS
245 7F8A 4500 A      PULL     AC1      ; DATA NOW IN AC1
246 7F8B 4C00 A      LI       AC0,0    ; ZERO STATUS
247 7F8C 0201 A      RTS       1       ; NORMAL RETURN
248 7F8D             ;
249 7F8D 5400 A $ERR: XCHRS    AC0      ; SAVE ERROR STATUS
250 7F8E 4400 A      PULL     AC0      ; PULL COUNTER AND TEMP
251 7F8F 5400 A      XCHRS    AC0
252 7F90 4400 A      PULL     AC0
253 7F91 0200 A      RTS       0       ; RETURN WITH ERROR
254 7F92             ;
255 7F92             ; RDLEN - READ RECORD LENGTH (CARD COLUMNS 2-4)
256 7F92             ;
257 7F92 4C03 A RDLEN: LI       AC0,3
258 7F93 21EA A      JMP      RD1      ; READ AND MERGE NEXT 3 COLUMNS
259 7F94             .PAGE
260 7F94             .LOCAL
261 7F94             ;
262 7F94             ; END CARD PROCESSING
263 7F94             ;
264 7F94 29FD A END:  JSR      RDLEN     ; SKIP OVER RECORD LENGTH
265 7F95 210D A      JMP      $ERR
266 7F96 29E6 A      JSR      RDWD     ; SKIP CHECKSUM
267 7F97 210B A      JMP      $ERR
268 7F98 29E4 A      JSR      RDWD     ; SKIP ADDRESS MODE
269 7F99 2109 A      JMP      $ERR
270 7F9A 29E2 A      JSR      RDWD     ; READ LOAD ADDRESS
271 7F9B 2107 A      JMP      $ERR
272 7F9C F589 A      SKNE     AC1,ZERO  ; STORE ONLY NON-ZERO ENTRY POINT
273 7F9D 21DD A      JMP      LAST
274 7F9E 5500 A      XCHRS    AC1      ; ENTRY POINT IS ON TOP OF THE STACK
275 7F9F 21DB A      JMP      LAST     ; IGNORE REST OF CARD
276 7FA0             ;
277 7FA0 4700 A ERR3: PULL     AC3      ; RETURN WITH PROPER NO. OF PULLS
278 7FA1 4700 A ERR2: PULL     AC3
279 7FA2 4700 A ERR1: PULL     AC3
280 7FA3             $ERR: ;          ; AC0 TELLS STATUS
281 7FA3 21D7 A VALID: JMP      LAST    ; IGNORE REST OF CARD
282 7FA4 219A A XCVT: JMP      CVT     ; LONG SUBROUTINE JUMP
283 7FA5             .PAGE
284 7FA5             ;
285 7FA5             ; DATA CARD PROCESSING
286 7FA5             ;
287 7FA5 29EC A DATA: JSR      RDLEN     ; GET RECORD LENGTH
288 7FA6 21FC A      JMP      $ERR
289 7FA7 4100 A      PUSH     AC1      ; SAVE BODY LENGTH
290 7FA8 29D4 A      JSR      RDWD
291 7FA9 21F8 A      JMP      ERR1
292 7FAA 5500 A      XCHRS    AC1      ; SAVE CHECKSUM
293 7FAB 4100 A      PUSH     AC1      ; SAVE LENGTH COUNTER IN STACK
294 7FAC 4F00 A      LI       AC3,0    ; INITIALIZE READ CHECKSUM
295 7FAD 29CF A      JSR      RDWD     ; SKIP ADDRESS MODE
296 7FAE 21F2 A      JMP      ERR2
297 7FAF 3700 A      RADD     AC1,AC3
298 7FB0 29CC A      JSR      RDWD     ; READ LOAD ADDRESS

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299 7FB1 21EF A      JMP      ERR2
300 7FB2 3700 A      RADD     AC1,AC3
301 7FB3 4100 A      PUSH     AC1          ; SAVE LOAD ADDRESS
302 7FB4 29C8 A      JSR      RDWD        ; SKIP 1ST RELOC FIELD
303 7FB5 21EA A      JMP      ERR3
304 7FB6 3700 A      RADD     AC1,AC3
305 7FB7 29C5 A      JSR      RDWD        ; SKIP 2ND RELOC FIELD
306 7FB8 21E7 A      JMP      ERR3
307 7FB9 3700 A      RADD     AC1,AC3
308 7FBA 4400 A      PULL     AC0          ; GET LOOP COUNTER
309 7FBB 5400 A      XCHRS   AC0
310 7FBC 48FC A      AISZ    AC0,-4      ; DECREMENT LENGTH COUNTER
311 7FBD 2100 A      JMP      .+1
312 7FBE 1B0D A      BOC      RLE0,TCKSM ; NO MORE DATA - CHECK THE CHECKSUM
313 7FBF          ;
314 7FBF 5400 A $LOOP: XCHRS   AC0          ; PUT LOOP COUNTER BACK ON STACK
315 7FC0 4000 A      PUSH     AC0          ; PUT LOAD ADDRESS ON TOP OF STACK
316 7FC1 29BB A      JSR      RDWD        ; READ DATA
317 7FC2 21DD A      JMP      ERR3
318 7FC3 4400 A      PULL     AC0
319 7FC4 3380 A      RXCH    AC0,AC3
320 7FC5 A700 A      ST       AC1,(AC3)    ; STORE THE DATA
321 7FC6 4B01 A      AISZ    AC3,1        ; INCREMENT THE ADDRESS
322 7FC7 3380 A      RXCH    AC0,AC3
323 7FC8 3700 A      RADD     AC1,AC3      ; UPDATE READ CHECKSUM
324 7FC9 5400 A      XCHRS   AC0          ; GET LOOP COUNTER
325 7FCA 48FF A      AISZ    AC0,-1
326 7FCB 21F3 A      JMP      $LOOP       ; LOOP UNTIL DONE
327 7FCC 4400 A TCKSM: PULL     AC0          ; PULL ADDRESS
328 7FCD 4400 A      PULL     AC0          ; PULL CARD CHECKSUM
329 7FCE 11D4 A      BOC      ZRO,VALID    ; IF CHECKSUM = 0, DATA IS VALID
330 7FCF 3C82 A      RXOR    AC3,AC0      ; COMPARE CHECKSUMS
331 7FD0 11D2 A      BOC      ZRO,VALID
332 7FD1 4C03 A      LI       AC0,3        ; CHECKSUM ERROR: CODE 3
333 7FD2 21D0 A      JMP      $ERR
334 7FD3          .PAGE    'USER ROUTINES'
335 7FD3          ;*****
336 7FD3          ;*
337 7FD3          ;*      READCARD ROUTINE - READ AN 80 COLUMN CARD INTO A BUFFER      *
338 7FD3          ;*                                  (NO CONVERSION)                      *
339 7FD3          ;*
340 7FD3          ;* CALLING SEQUENCE:
341 7FD3          ;*
342 7FD3          ;*      LD       AC2,BUFAD      ; LOAD BUFFER ADDRESS
343 7FD3          ;*      JSR      RDCARD      ; READ CARD INTO THE BUFFER
344 7FD3          ;*
345 7FD3          ;* RETURN:      RTS 0          ERROR (MOTION/HOPPER/OFFLINE)
346 7FD3          ;*              RTS 1          NORMAL RETURN
347 7FD3          ;*
348 7FD3          ;* ALL REGISTERS ARE SAVED AND RESTORED
349 7FD3          ;*
350 7FD3          ;*****
351 7FD3          ;
352 7FD3 4000 A RDCARD: PUSH     AC0          ; SAVE REGISTERS
353 7FD4 4100 A      PUSH     AC1
354 7FD5 4300 A      PUSH     AC3
355 7FD6 4200 A      PUSH     AC2          ; BUFFER ADDRESS IS IN AC2
356 7FD7 4F10 A      LI       AC3,CRADR    ; LOAD CARD READER ADDRESS
357 7FD8 4D50 A      LI       AC1,80
358 7FD9 0A80 A      PFLG     2            ; RESET SELECT FLAG
359 7FDA 0603 A      ROUT     RESET        ; RESET INDEX MARK FF
360 7FDB 0602 A      ROUT     PICK
361 7FDC 0401 A $STRT: RIN      READ        ; GET DATA

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362 7FDD 1401 A      BOC      BIT1, .+2      ; CHECK FOR READY
363 7FDE 210F A      JMP      MOTERR          ; ERROR RETURN IF CRDR IS OFFLINE
364 7FDF 1303 A      BOC      BIT0, COL       ; TEST FOR INDEX MARK
365 7FE0 719B A      SKAZ     AC0, HC         ; TEST FOR HOPPER/MOTION CHECK
366 7FE1 210C A      JMP      MOTERR
367 7FE2 21F9 A      JMP      $STRT
368 7FE3 0603 A COL:  ROUT     RESET          ; RESET FLIP-FLOPS
369 7FE4 5CFC A      SHR      AC0, 4          ; STRIP STATUS BITS
370 7FE5 A200 A      ST       AC0, (AC2)       ; SAVE DATA IN BUFFER
371 7FE6 4A01 A      AISZ     AC2, 1          ; INCREMENT BUFFER ADDRESS
372 7FE7 49FF A      AISZ     AC1, -1         ; DECREMENT COLUMN COUNT
373 7FE8 21F3 A      JMP      $STRT
374 7FE9 4600 A      PULL     AC2
375 7FEA 4700 A      PULL     AC3
376 7FEB 4500 A      PULL     AC1
377 7FEC 4400 A      PULL     AC0
378 7FED 0201 A      RTS      1
379 7FEE          ;
380 7FEE 0603 A MOTERR: ROUT     RESET          ; MOTION ERROR / HOPPER CHECK
381 7FEF 4600 A RETURN: PULL     AC2
382 7FF0 4700 A      PULL     AC3
383 7FF1 4500 A      PULL     AC1
384 7FF2 4400 A      PULL     AC0
385 7FF3 0200 A      RTS      0
386 7FF4          .PAGE
387 7FF4          .LOCAL
388 7FF4          ;*****
389 7FF4          ;*
390 7FF4          ;*      CNVRT - CONVERT BUFFER TO HEX
391 7FF4          ;*
392 7FF4          ;* CALLING SEQUENCE:
393 7FF4          ;*
394 7FF4          ;*      LD      AC2, BUFAD      ; LOAD BUFFER ADDRESS
395 7FF4          ;*      JSR      CNVRT          ; CONVERT THE BUFFER TO HEX
396 7FF4          ;*
397 7FF4          ;* EACH WORD OF THE BUFFER IS CONVERTED TO ITS BINARY EQUIVALENT.
398 7FF4          ;* IF THE HOLLERITH CODE IS NOT A VALID HEX CHARACTER, THE HOLLERITH
399 7FF4          ;* CODE IS STORED INSTEAD (BITS 4-15; BITS 0-3 ARE 0)
400 7FF4          ;*
401 7FF4          ;* ALL REGISTERS ARE SAVED AND RESTORED
402 7FF4          ;*
403 7FF4          ;*****
404 7FF4          ;
405 7FF4 4000 A CNVRT:  PUSH     AC0          ; SAVE REGISTERS
406 7FF5 4100 A      PUSH     AC1
407 7FF6 4300 A      PUSH     AC3
408 7FF7 4200 A      PUSH     AC2          ; BUFFER ADDRESS IS IN AC2
409 7FF8 4F50 A      LI      AC3, 80
410 7FF9 8200 A $LOOP: LD      AC0, (AC2)
411 7FFA 29A9 A      JSR      XCVT
412 7FFB A600 A      ST       AC1, (AC2)      ; STORE BINARY VALUE (UNLESS ERROR)
413 7FFC 4A01 A      AISZ     AC2, 1
414 7FFD 4BFF A      AISZ     AC3, -1
415 7FFE 21FA A      JMP      $LOOP
416 7FFF 21EF A      JMP      RETURN
417 8000          ;
418 8000 7F00 A      .END    ABSCR

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***** 0 ERRORS IN ASSEMBLY *****

CRD16P

\$COL!	\$DONE!	\$ERR"	\$ERR#	\$LOOP#	\$LOOP\$	\$MOTE!	\$STRT!	\$STRT#	ABSCR
7F38 A	7F3A A	7F8D A	7FA3 A	7FBF A	7FF9 A	7F34 A	7F2D A	7FDC A	7F00 A
AC0	AC1	AC2	AC3	BIT0	BIT1	BLANK	CNVRT	COL	COMMAN
0000 A	0001 A	0002 A	0003 A	0003 A	0004 A	7F63 A	7FF4 A	7FE3 A	7F10 A
CRADR	CVT	DATA	END	ERR1	ERR2	ERR3	EXCLAM	FIRST	G
0010 A	7F3F A	7FA5 A	7F94 A	7FA2 A	7FA1 A	7FA0 A	7F29 A	7F02 A	7F2A A
GO	GODATA	GOEND	HC	IGNORE	INVCAR	LAST	MORE	MOTERR	NZRO
7F20 A	7F7A A	7F79 A	7F7C A	7F14 A	7F65 A	7F7B A	7F80 A	7FEE A	0005 A
PICK	RD1	RDCARD	RDCOL	RDLEN	RDWD	READ	RESET	RETURN	RLE0
0002 A	7F7E A	7FD3 A	7F2B A	7F92 A	7F7D A	0001 A	0003 A	7FEF A	000B A
SIX	SKIP	TBL	TCKSM	VALID	XCVT	ZERO	ZRO		
7F1E A	7F11 A	7F69 A	7FCC A	7FA3 A	7FA4 A	7F26 A	0001 A		

F220 B6B3

PNL16P

REVISION-G 05/16/74
PNL16P 00311A 12/11/73

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1 0000      .TITLE  PNL16P,'00311A   12/11/73'
2 0000      .ASECT
3 0000      ;
4 0000      ;
5 0000      ;*****
6 0000      ;*
7 0000      ;*      IMP-16P CCNTROL PANEL ROUTINE
8 0000      ;*
9 0000      ;*      THIS PRGGRAM FITS INTO 2 8X256-BIT PROMS CN THE
10 0000     ;*      IMP16P CCNTROL PANEL INTERFACE CARD:
11 0000     ;*
12 0000     ;*
13 0000     ;*      ADDRESSES  BITS  PROM  DIAGRAM
14 0000     ;*      CO-ORDINATE
15 0000     ;*      4600311 LOW  FF00-FFFF  0-7   BIU      6H
16 0000     ;*      4610311 HIGH FF00-FFFF  8-15  BIV      7H
17 0000     ;*
18 0000     ;*****
19 0000     ;
20 0000     ;
21 0000     ;      *** DEFINITICNS ***
22 0000     ;
23 0000 7E00 A RLOADER =      X*7E00      ; PAPER TAPE LCADER ENTRY
24 0000 0000 A SORET  =      C      ; STACK OFLO RETURN ADDR
25 0000 FF00 A RGMORG =      X*FF00
26 0000 FF01 A RAM    =      RGMCRG + 1
27 0000 FF7F A IENS   =      C2
28 0000 FF80 A SELS   =      D4
29 0000      ;
30 0000      ;      JUMP CONDITIONS
31 0000      ;
32 0000 0001 A REQO    =      1      ; (AC0) = 0
33 0000 0003 A RBITO   =      3      ; AC0(0) = 1
34 0000 0004 A RBIT1   =      4      ; AC0(1) = 1
35 0000 0008 A STKFULL =      8      ; STACK FULL
36 0000 0009 A IEN     =      9      ; INTERRUPTS ENABLED
37 0000 000B A RLEO    =     11      ; (AC0) <= 0
38 0000      ;
39 0000      ;      HARDWARE FLAGS
40 0000      ;
41 0000 0002 A SELX    =      2      ; SELX FLAG
42 0000 0001 A IENF    =      1      ; INTERRUPTS ENABLE FF
43 0000      ;
44 0000      ;      REGISTERS
45 0000      ;
46 0000 0000 A AC0     =      0
47 0000 0001 A AC1     =      1
48 0000 0002 A XR2     =      2
49 0000 0003 A XR3     =      3

50 0000      .PAGE  'SOFTWARE DESCRIPTION'
51 0000      ;
52 0000      ; CCNTROL CONSOLE CCMMANDS:
53 0000      ;
54 0000      ;      NOTE: THESE COMMANDS ARE VALID ONLY WHEN SENT DURING THE
55 0000      ;      CONTROL PANEL SERVICE ROUTINE. THEY CANNOT BE USED
56 0000      ;      BY USER PROGRAMS (HARDWARE RESTRICTION).
57 0000      ;
58 0000      ;      1. TO EXECUTE CCNTROL PANEL COMMANDS, AC3 MUST
59 0000      ;      CONTAIN THE CCNTROL PANEL ADDRESS (CPAD):
60 0000      ;

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61 0C00      ;      LD      AC3,CPAC
62 0000      ;
63 0000      ;      2.  TO LOAD THE PROGRAM COUNTER DISPLAY REGISTER
64 0000      ;      WITH THE CONTENTS OF AC0:
65 0000      ;
66 0000      ;      ROUT    LPCDR
67 0000      ;
68 0000      ;      3.  TO LOAD THE DATA REGISTER WITH THE CONTENTS
69 0000      ;      OF AC0:
70 0000      ;
71 0000      ;      ROUT    LDR
72 0000      ;
73 0000      ;      4.  TO GET THE DATA SWITCHES AND LOAD THEM INTO AC0:
74 0000      ;
75 0C00      ;      RIN     GDS
76 0000      ;
77 0000      ;      5.  TO GET THE PANEL COMMAND SWITCH AND LOAD IT
78 0000      ;      INTO AC0:
79 0000      ;
80 0000      ;      RIN     GPCS
81 0000      ;
82 0000      ;      6.  TO ALLOW THE NEXT INSTRUCTION TO ACCESS USER MEMORY
83 0C00      ;      (FOR ONE LOAD/STORE ONLY):
84 0000      ;
85 0000      ;      ROUT    EUM
86 0000      ;
87 0000      ;
88 0000 FF85 A CPAC    =      H760      ; (H760 IS THE ADDRESS OF
89 0000      ;      ; A WORD THAT CONTAINS X'760)
90 0000 0000 A LPCDR   =      X'00      ; LCAD PC DISPLAY REG
91 0000      ;
92 0000 0008 A LDR     =      X'08      ; LOAD DATA DISPLAY REG
93 0000      ;
94 0000 0010 A GDS     =      X'10      ; GET DATA SWITCHES
95 0000      ;
96 0000 0018 A GPCS    =      X'18      ; GET PNL CONT SWITCHES
97 0000      ;
98 0000 0001 A EUM     =      X'01      ; ENABLE USER MEMORY

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99 0000      .PAGE
100 0000      ;
101 0000      ;      COMMAND WORD BIT ASSIGNMENTS:
102 0000      ;
103 0C00      ;      BIT      INDICATION
104 0000      ;      ---      -
105 0000      ;
106 0000      ;      15      A ZERO INDICATES THAT THE CONSOLE HAS
107 0000      ;      BEEN SERVICED AT LEAST ONCE SINCE THE
108 0000      ;      LAST BUTTON WAS DEPRESSED.
109 0C00      ;
110 0000      ;      14      LOAD DATA PUSHBUTTON
111 0000      ;
112 0000      ;      13      INCREMENT MEMORY ADDRESS PUSHBUTTON
113 0000      ;
114 0000      ;      12      LCAD PROGRAM PUSHBUTTON
115 0C00      ;
116 0000      ;      11      (NOT USED)
117 0000      ;
118 0000      ;      10      AC0 SELECTED
119 0000      ;
120 0000      ;      9       AC1 SELECTED
121 0000      ;
122 0000      ;      8       AC2 SELECTED
123 0000      ;
124 0000      ;      7       AC3 SELECTED
125 0000      ;

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126 0000 ;          6    PROGRAM COUNTER SELECTED
127 0000 ;
128 0000 ;          5    NEXT INSTRUCTION SELECTED
129 0000 ;
130 0000 ;          4    FLAGS SELECTED
131 0000 ;
132 0000 ;          3    STACK SELECTED
133 0000 ;
134 0000 ;          2    MEMORY ADDRESS POINTER SELECTED
135 0000 ;
136 0000 ;          1    MEMORY DATA SELECTED
137 0000 ;
138 0000 ;          0    PROGRAMMED DATA SELECTED

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139 0000 .PAGE
140 0000 ;
141 0000 ; CONTROL PANEL SERVICE IN TRANSPARENT MEMORY
142 0000 ;
143 0000 ; STORAGE ASSIGNMENTS AND DISPLACEMENT TABLE
144 0000 ;
145 0000 ;          AC2 DISPLACEMENT
146 0000 ;LOCA-          (IN DECIMAL)
147 0000 ;TIGN          ENTRY  CONSOLE
148 0000 ;{HEX}  USAGE          EXIT  SERVICE  NOTES
149 0000 ;---  -----  ---  ---  -----
150 0000 ;
151 0000 ;*00          -3    -19
152 0000 ;*01    AC0          -2    -18
153 0000 ;*02    AC1          -1    -17
154 0000 ;*03    AC2           0    -16
155 0000 ;*04    AC3           1    -15
156 0000 ;*05    PC            2    -14    CURRENT TOP OF STACK
157 0000 ;*06    STACK          3    -13    TOP OF USER STACK
158 0000 ;*07    STK1           4    -12
159 0000 ;*08    STK2           5    -11
160 0000 ;*09    STK3           6    -10
161 0000 ;*0A    STK4           7     -9
162 0000 ;*0B    STK5           8     -8
163 0000 ;*0C    STK6           9     -7
164 0000 ;*0D    STK7          10     -6
165 0000 ;*0E    STK8          11     -5
166 0000 ;*0F    STK9          12     -4
167 0000 ;*10    STK10         13     -3
168 0000 ;*11    STK11         14     -2
169 0000 ;*12    STK12         15     -1
170 0000 ;*13    STK13         16      0
171 0000 ;*14    STK14         17      1
172 0000 ;*15    DISPLAYED FLAGS 18      2
173 0000 ;*16    RALU FLAGS       19      3
174 0000 ;*17    MEM ADDRESS PTR 20      4
175 0000 ;*18          21      5
176 0000 ;*19          22      6
177 0000 ;*1A          23      7
178 0000 ;*1B          24      8
179 0000 ;*1C          25      9
180 0000 ;*1D          26     10
181 0000 ;*1E          27     11
182 0000 ;*1F          28     12
183 0000 ;
184 0000 ; * ACTUAL ADDRESS PAGE = FF00; CONTROL PANEL
185 0000 ; INTERFACE HARDWARE ONLY LOOKS AT LOWER EIGHT BITS.

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186 0000          .PAGE  'CONTRL CONSOLE SERVICE'
187 0000          .LOCAL
188 0030 FF40 A    .=ROMORG+040
189 FF40          RCCNSOLE:          ; SAVE ACCUMULATORS
190 FF40 B941 A    ST      XR2,2AC2P ;
191 FF41 8940 A    LD      XR2,AC2P  ; XR2 POINTS TO THE XR2
192 FF42 A2FE A    ST      AC0,-2(XR2) ; SAVE LOCATION.
193 FF43 A6FF A    ST      AC1,-1(XR2) ;
194 FF44 AE01 A    ST      XR3,1(XR2) ;
195 FF45          ;
196 FF45 4400 A    PULL     AC0       ; SAVE THE RALU FLAGS
197 FF46 008C A    PUSHF    AC0       ; IN AC0.
198 FF47 5400 A    XCHRS   AC0       ;
199 FF48          ; SAVE THE STACK ~
200 FF48 4D04 A    LI      AC1,4      ; 4 PASS STACK SAVE
201 FF49 4700 A $0: PULL     XR3       ; SEQUENCE REQUIRES 6
202 FF4A AEC2 A    ST      XR3,2(XR2) ; MORE WORDS THAN A 16
203 FF4B 4700 A    PULL     XR3       ; PASS SEQUENCE.
204 FF4C AE03 A    ST      XR3,3(XR2) ; EXECUTION TIME FOR
205 FF4D 4700 A    PULL     XR3       ; THIS SEQUENCE IS 255
206 FF4E AE04 A    ST      XR3,4(XR2) ; MICROCYCLES VS.
207 FF4F 47C0 A    PULL     XR3       ; 440 MICROCYCLES FOR
208 FF50 AE05 A    ST      XR3,5(XR2) ; THE 16 PASS CASE.
209 FF51          ;
210 FF51 4A04 A    AISZ    XR2,4      ; INCREMENT XR2 BY 4
211 FF52 49FF A    AISZ    AC1,-1    ; DECREMENT PASS COUNTER
212 FF53 21F5 A    JMP     $0        ; JUMP BACK TO $0 IF NOT
213 FF54          ; DONE.
214 FF54          ;
215 FF54          ; ON EXIT XR2 CCNTAINS X*13 = (AC2P) + 16.
216 FF54          ;
217 FF54          ; PUT THE SELECT AND INTERRUPT ENABLE FLAGS INTO BIT
218 FF54          ; POSITIONS 2 AND 1 OF THE FLAG WORD TO BE DISPLAYED.
219 FF54          ;
220 FF54          ; FIRST SET BITS 1 AND 2
221 FF54          ;
222 FF54 A203 A    ST      AC0,3(XR2) ; SAVE THE RALU FLAGS
223 FF55          ; IN MEMORY LOCATION X*16
224 FF55 692B A    OR      AC0,D6     ; SET BITS 1 AND 2 TO ONE
225 FF56 1901 A    BOC     IEN,+.2    ; BRANCH IF THE INTERRUPT
226 FF57          ; ENABLE IS SET
227 FF57 48FE A    AISZ    AC0,-2     ; IT IS NOT SET, CLEAR BIT 1
228 FF58 3381 A    RCPY    AC0,XR3    ;
229 FF59 4C01 A    LI      AC0,1      ; TEST SEL FLAG
230 FF5A 58EF A    ROR     AC0,17     ;
231 FF5B 1302 A    BCC     RBIT0,LSEL ; BRANCH IF SET
232 FF5C 4BFC A    AISZ    XR3,-4     ; IT IS NOT SET, CLEAR
233 FF5D          ; BIT 2. SKIP MAY OCCUR
234 FF5D 2100 A    JMP     .+1        ; SO DO A HIGH SPEED NOP
235 FF5E          ;
236 FF5E AE02 A LSEL: ST      XR3,2(XR2) ; STORE THE DISPLAYED
237 FF5F          ; FLAGS IN LOCATION X*15.
238 FF5F          ;
239 FF5F          ; INPUT THE COMMAND AND DATA WORDS FROM THE CONSOLE
240 FF5F          ;
241 FF5F 8D25 A    LD      XR3,CPAD   ; XR3 := CONTROL PANEL ADDRESS
242 FF60 0418 A    RIN     GPCS       ; FETCH THE PANEL CONTRL WORD
243 FF61 3181 A    RCPY    AC0,AC1    ; NOTE: GPCS MUST BE READ FIRST
244 FF62 0410 A    RIN     GDS        ; FETCH THE DATA SWITCHES
245 FF63 3180 A    RXCH    AC0,AC1    ;
246 FF64 4F01 A    LI      XR3,1      ; XR3 WILL INDICATE WHETHER
247 FF65          ; OR NOT THE LOAD DATA
248 FF65          ; SWITCH HAS BEEN DEPRESSED
249 FF65 0A80 A    PFLG     SELF      ; MAKE SURE SELX FLAG IS OFF
250 FF66 5803 A    ROL     AC0,3      ; RIGHT JUSTIFY BITS 15,14,13
251 FF67          ;
252 FF67          ; ***ACTIVE SWITCH IS 'ZERO' AT THIS POINT***
253 FF67          ;

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254 FF67 7118 A      SKAZ   ACO,D4      ; TEST PCS(15). IF IT'S A
255 FF68 2101 A      JMP     .+2          ; 1 THEN TEST THE OTHER
256 FF69 2109 A      JMP     $3          ; SWITCHES. IF IT IS A 0
257 FF6A          ; DO NOT TEST THEM.
258 FF6A 1803 A      BOC     RLEC,$1      ; BRANCH IF BIT 15 =PCS(12) IS
259 FF6B 8D18 A      LD      XR3,LOADER  ; NOT 0. THE COMMAND
260 FF6C          ; WORD WILL NEVER BE 0).
261 FF6C          ; IF BIT 15 IS 0 THEN
262 FF6C AEF2 A      ST      XR3,-14(XR2) ; PUT THE LOADER ADDRESS
263 FF6D 4F01 A      LI      XR3,1       ; IN THE RETURN PC.
264 FF6E 1302 A $1:   BOC     RBIT0,$2    ; TEST INC MEM ADDR SWITCH
265 FF6F 7A04 A      ISZ     4(XR2)       ; INCREMENT THE MEMORY
266 FF70          ; ADDRESS POINTER THEN
267 FF70 2100 A      JMP     .+1          ; DO A HIGH SPEED NO OP
268 FF71 1401 A $2:   BOC     RBIT1,$3    ; TEST LOAD DATA SWITCH
269 FF72 4F00 A      LI      XR3,0       ; THE LOAD DATA SWITCH
270 FF73          ; HAS BEEN DEPRESSED.
271 FF73          ; SET XR3 TO 0 TO INDICATE THIS
272 FF73 CD0F A $3:   ADD     XR3,ADD1
273 FF74 50C0 A      CAI     ACO,0
274 FF75          ;
275 FF75          ; ***NOW ACTIVE SWITCH IS 'ONE'***
276 FF75          ;
277 FF75 5CFE A      SHR     ACO,2
278 FF76 61CF A      AND     ACO,HFFC      ; MASK OFF THE UNWANTED BITS
279 FF77 5CFE A $6:   SHR     ACO,2
280 FF78 1304 A      BOC     RBIT0,$7
281 FF79 1404 A      BOC     RBIT1,$8
282 FF7A 4B06 A      AISZ    XR3,6
283 FF7B 112E A      BOC     REQ0,RESTORE ; SWITCH IS IN AN
284 FF7C          ; INTERMEDIATE POSITION
285 FF7C 21FA A      JMP     $6
286 FF7D 23C0 A $7:   JMP     (XR3)
287 FF7E 2303 A $8:   JMP     3(XR3)
288 FF7F          ;
289 FF7F          ;
290 FF7F 0002 A D2:   .WORD   2          ; *** CONSTANTS ***
291 FF80 0004 A D4:   .WORD   4
292 FF81 0006 A D6:   .WORD   6
293 FF82 FF03 A AC2P: .WORD   RAM + 2
294 FF83 FF88 A ADD1: .WORD   DMD
295 FF84 7E00 A LCADER: .WORD  RLCADER
296 FF85 0760 A H760: .WORD   X'0760
297 FF86 0FFC A HFFC: .WORD   X'0FFC
298 FF87 FFF9 A HFFF9: .WORD  X'FFF9
299 FF88          ;
300 FF88          ;
301 FF88 2149 A DMD:   JMP     LDMC       ; DISPLAY MEMORY DATA
302 FF89 4C00 A      LI      ACO,0       ; SET FLAG FOR READ
303 FF8A 2147 A      JMP     LDMC
304 FF8B A604 A DMAR: ST      AC1,4(XR2)  ; STORE THE DATA SWITCHES
305 FF8C          ; IN THE MEMORY ADDRESS
306 FF8C          ; POINTER (LOCATION X'*17.)
307 FF8C 8604 A      LD      AC1,4(XR2)  ; LOAD AC1 WITH THE
308 FF8D          ; CONTENTS OF THE MEMORY
309 FF8D          ; ADDRESS POINTER (LOC X'*17)
310 FF8D 2117 A      JMP     PCDEX       ; JUMP TO DISPLAY PC,AC1.
311 FF8E A6F3 A DSTACK: ST    AC1,-13(XR2) ; DISPLAY THE TOP OF THE STACK
312 FF8F 86F3 A      LD      AC1,-13(XR2)
313 FF90 2114 A      JMP     PCDEX
314 FF91 A602 A CFLAGS: ST    AC1,2(XR2)  ; DISPLAY THE FLAGS
315 FF92 8602 A      LD      AC1,2(XR2)
316 FF93 2111 A      JMP     PCDEX
317 FF94 213F A DNI:   JMP     LDNI       ; DISPLAY THE NEXT INSTRUCTION
318 FF95 4C00 A      LI      ACO,0       ; SET FLAG FOR READ
319 FF96 213D A      JMP     LDNI
320 FF97 A6F2 A DPC:   ST      AC1,-14(XR2) ; DISPLAY THE
321 FF98 86F2 A      LD      AC1,-14(XR2) ; PROGRAM COUNTER

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322 FF99 210B A      JMP      PCDEX
323 FF9A A6F1 A DXR3: ST      AC1,-15(XR2) ; DISPLAY XR3
324 FF9B 86F1 A      LD      AC1,-15(XR2)
325 FF9C 210B A      JMP      PCDEX
326 FF9D A6F0 A DXR2: ST      AC1,-16(XR2) ; DISPLAY XR2
327 FF9E 86F0 A      LD      AC1,-16(XR2)
328 FF9F 2105 A      JMP      PCDEX
329 FFA0 A6EF A CAC1: ST      AC1,-17(XR2) ; DISPLAY AC1
330 FFA1 86EF A      LD      AC1,-17(XR2)
331 FFA2 2102 A      JMP      PCDEX
332 FFA3 A6EE A CACO: ST      AC1,-18(XR2) ; DISPLAY ACO
333 FFA4 86EE A      LD      AC1,-18(XR2)
334 FFA5 82F2 A PCDEX: LD      ACO,-14(XR2) ; PUT THE DISPLAYED PC IN ACO
335 FFA6 8DDE A      LD      XR3,CPAD ; DISPLAY THE CONTENTS OF
336 FFA7 ; ; ACO IN THE PC/MEM ADDRESS
337 FFA7 ; ; LIGHTS AND DISPLAY AC1 IN
338 FFA7 ; ; THE SELECTED DISPLAY LIGHTS
339 FFA7 0600 A D01:  ROUT     LPCDR
340 FFA8 3481 A      RCPY     AC1,ACO
341 FFA9 06C8 A      ROUT     LDR
342 FFAA ; ; RESTORE THE INTERRUPT
343 FFAA 8202 A      LD      ACO,2(XR2) ; ENABLE AND SELECT FLAGS.
344 FFA8 71C4 A      SKAZ     ACO,SELS ; THE SELECT FLAG WAS
345 FFAC 0A00 A      SFLG     SELF ; CLEARED IN THE PANEL
346 FFAD 0580 A      PFLG     IENF ; SERVICE SEQUENCE.
347 FFAE 71C0 A      SKAZ     ACO,IENS
348 FFAF 0900 A      SFLG     IENF
349 FFB0 61D6 A      AND      ACO,HFFF9 ; MAKE UP THE NEW RALU
350 FFB1 8603 A      LD      AC1,3(XR2) ; FLAGS
351 FFB2 65CE A      AND      AC1,D6
352 FFB3 31C0 A      RADD     ACO,AC1 ; THE NEW FLAGS ARE SAVED
353 FFB4 ; ; IN AC1 WHILE THE STACK
354 FFB4 ; ; IS RESTORED
355 FFB4 ; ;
356 FFB4 ; ; RESTORE THE STACK:
357 FFB4 4FD4 A      LI      XP3,4 ; 4 PASS SEQUENCE REQUIRES
358 FFB5 4AFC A $4:  AISZ     XR2,-4 ; 6 MORE WORDS THAN A 16
359 FFB6 8205 A      LD      AC0,5(XR2) ; PASS SEQUENCE BUT
360 FFB7 4000 A      PUSH     ACO ; EXECUTES IN 247
361 FFB8 8204 A      LD      ACO,4(XR2) ; MICROCYCLES AS
362 FFB9 4000 A      PUSH     ACO ; OPPOSED TO 432
363 FFB8 8203 A      LD      ACO,3(XR2) ; MICROCYCLES
364 FFB8 4000 A      PUSH     ACO
365 FFB8 8202 A      LD      ACO,2(XR2)
366 FFB8 4000 A      PUSH     ACO
367 FFB8 4BFF A      AISZ     XR3,-1
368 FFBF 21F5 A      JMP      $4

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369 FFC0 ; .PAGE 'RETURN TO USER PROGRAM'
370 FFC0 ;
371 FFC0 ; STACK OVERFLOW HANDLER
372 FFC0 ;
373 FFC0 ; IF THE STACK IS FULL THEN IT IS POSSIBLE THAT THE
374 FFC0 ; CONSOLE SERVICE ROUTINE HAS PUSHED A VALUE OFF THE
375 FFC0 ; BOTTOM OF THE STACK. IN THIS EVENTUALITY, THE
376 FFC0 ; INTERRUPT ENABLE FLAG IS CLEARED AND CONTROL IS
377 FFC0 ; RETURNED TO LCC 0 WITH THE OLD PC ON TOP OF THE
378 FFC0 ; STACK. THE BOTTOM TWO STACK POSITIONS MUST BE
379 FFC0 ; CLEARED TO GUARANTEE PROGRAM STABILITY IN THE OVER-
380 FFC0 ; FLOW CONDITION WHILE IN THE SINGLE INSTRUCTION MODE.
381 FFC0 ;
382 FFC0 1801 A      BOC      STKFULL, +2 ; IS THE STACK FULL?
383 FFC1 2105 A      JMP      $6 ; NO, JUMP AROUND THIS.
384 FFC2 810E A      LD      ACO,PRTN ; YES, PUT THE PANEL OVER-
385 FFC3 4000 A      PUSH     ACO ; FLOW RETURN LOCATION ON
386 FFC4 4000 A      PUSH     ACO ; THE STACK, PUSHING OFF
387 FFC5 4400 A      PULL     ACO ; STK14, THEN PUSH OFF

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388 FFC6                ; STK13 AND PULL ONCE TO CLEAR
389 FFC6                ; THE STACK BOTTOM. THE NEXT
390 FFC6                ; TO STACK BOTTOM WILL BE
391 FFC6                ; CLEARED WITH THE RTS RETURN.
392 FFC6 0980 A          PFLG      IENF      ; FINALLY, CLEAR THE
393 FFC7                ; INTERRUPT ENABLE.
394 FFC7                ;
395 FFC7 55C0 A $6:      XCHRS      AC1      ; RESTORE THE RALU FLAGS
396 FFC8 0280 A          PULLF
397 FFC9 41C0 A          PUSH      AC1
398 FFCA 82FE A          LD        AC0,-2(XR2) ; RESTORE THE REGISTERS
399 FFCB 86FF A          LD        AC1,-1(XR2)
400 FFCC 8E01 A          LD        XR3,1(XR2)
401 FFCD 8A00 A          LD        XR2,(XR2)
402 FFCE                ;
403 FFCE A101 A          ST        ACC,$DUMY  ; * RETURN *
404 FFCF                ; SET 'LAST' F-F SC 'RTS'
405 FFCF 02C0 A          RTS        0        ; RETURNS TO USER MEMORY.
406 FFD0 FFD1 A $DUMY:  .=-,+1          ; ENABLE AND RETURN.
407 FFD1 0000 A PRN:     .WORD      SCRET    ; PANEL SVC STK GFLC RETURN

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408 FFD2                .PAGE   'ACCESSING USER MEMORY'
409 FFD2                ;
410 FFD2                ;   ACCESSING USER MEMORY FOR
411 FFD2                ;   'MEMORY DATA' OR 'NEXT INSTRUCTION'
412 FFD2                ;
413 FFD2                ;   ON ENTRY TO LDMD OR LDNI:
414 FFD2                ;           AC0 = 0      READ USER MEMORY
415 FFD2                ;           AC0 = 1      ALTER USER MEMORY
416 FFD2                ;
417 FFD2 8A04 A LDMD:    LD        XR2,4(XR2)  ; LOAD MEMORY DATA POINTER
418 FFD3 2101 A          JMP        .+2
419 FFD4 8AF2 A LDNI:    LD        XR2,-14(XR2) ; LOAD NEXT INSTRUCTION PTR
420 FFD5 8DAF A          LD        XR3,CPAD
421 FFD6 1103 A          BOC        REQ0,RDMEM ; CHECK IF ALTER OR READ
422 FFD7 0601 A          ROUT      EUM
423 FFD8 A6C0 A          ST        AC1,(XR2)   ; ALTER USER MEMORY
424 FFD9 2102 A          JMP        .+3
425 FFCA 0601 A RDMEM:  ROUT      EUM
426 FFDB 86C0 A          LD        AC1,(XR2)   ; READ USER MEMORY
427 FFDC 3881 A          RCPY      XR2,AC0     ; PUT ADDR IN AC0 FOR DISPLAY
428 FFDD 4E13 A          LI        XR2,X*13    ; PANEL ADDRESS HARDWARE ONLY
429 FFDE                ; LOOKS AT THE LOWER EIGHT
430 FFDE                ; BITS OF THE ADDRESS
431 FFDE 21C8 A          JMP        D01

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432 FFDF                .PAGE   'ENTRY PCINT'
433 FFDF FFFD A          .=-RGMORG+0FD
434 FFFD 2501 A CONSOLE: JMP      @CPOINT    ; CONTROL CONSOLE ENTRY
435 FFFE 2000 A INIT:    JMP        0        ; DUMMY INIT. ENTRY PCINT
436 FFFF FF40 A CPCINT: .WORD      RCONSOLE
437 000 FF40 A          .END      RCONSOLE

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***** 0 ERRORS IN ASSEMBLY *****

\$0"	\$1"	\$2"	\$3"	\$4#	\$6"	\$6#	\$7"	\$8"	\$DUMY#
FF49 A	FF6E A	FF71 A	FF73 A	FFB5 A	FF77 A	FFC7 A	FF7D A	FF7E A	FFD0 A
AC0	AC1	AC2P	ADD1	CCNSOL	CPAD	CPOINT	D01	D2	D4
0000 A	0001 A	FF82 A	FF83 A	FFFD A	FF85 A	FFFF A	FFA7 A	FF7F A	FF80 A
C6	CAC0	DAC1	DFLAGS	DMAR	DMD	DNI	DPC	DSTACK	DXR2
FF81 A	FFA3 A	FFA0 A	FF91 A	FF8B A	FF88 A	FF94 A	FF97 A	FF8E A	FF9D A
CXR3	EUM	GDS	GPCS	H760	HFFC	HFFF9	IEN	IENF	IENS
FF9A A	0001 A	0010 A	0018 A	FF85 A	FF86 A	FF87 A	0009 A	0001 A	FF7F A
INIT	LDMO	LDNI	LDR	LCADER	LPCDR	LSEL	PCDEX	PRTN	RAM
FFFE A	FFD2 A	FFD4 A	0008 A	FF84 A	0000 A	FF5E A	FFA5 A	FFD1 A	FF01 A
RBIT0	RBIT1	RCCNSO	RDMEM	REQ0	RESTOR	RLEC	RLOADE	RCMORG	SELF
0003 A	0004 A	FF40 A	FFDA A	0001 A	FFAA A	000B A	7E00 A	FF00 A	0002 A
SELS	SORET	STKFUL	XR2	XR3					
FF80 A	0000 A	0008 A	0002 A	0003 A					

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